TEXTILES PAPER LEATHER

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Including the Proceedings of the
AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS

VOLUME XIV AUGUST 24, 1925 NUMBER 14

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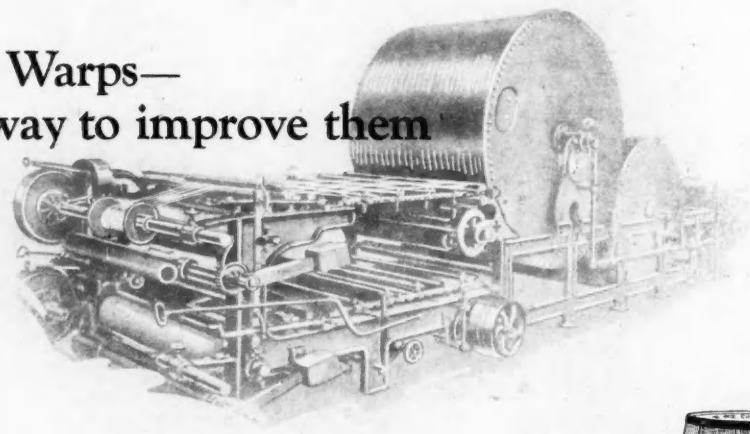

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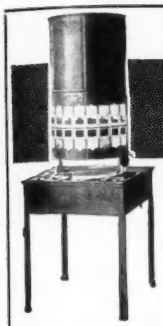

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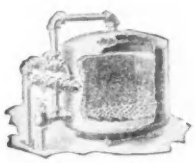

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VOLUME XIV | NEW YORK, AUGUST 24, 1925 | NUMBER 14

The Classification of Raw Silk by Means of Mechanical Tests

PART I

Raw Silk Skeins—Making the Thread—Classification by Grades—The Raw Silk Inspector—Inadequacy of Physical Tests

By KARL R. MOORE

THE raw silk of commerce comes to the manufacturer in skeins weighing from two and one-half to three and one-half ounces and containing from forty-five thousand to sixty-five thousand yards per skein. These skeins are packed in a bale in books of thirty skeins each, and the bale weighs about one hundred twenty-five to one hundred thirty pounds.

The thread of these skeins has been made at the filature or reeling establishment by immersing the cocoons in boiling water, and reeling off the filament of several cocoons simultaneously. Each of these cocoon filaments weighs about two and one-half denier per four hundred fifty meters of length and the number of these cocoons utilized to make the thread is in accordance with the size desired. The most popular size in this country desired by manufacturers is 13/15 denier in Japan silk, and this is made by taking the filament of five or six cocoons from the immersion basin and passing them through a small porcelain orifice. (Fig. 1.) The boiling water in the basin softens the sericin, and in passing through the orifice the threads are kneaded together. Twist is put in by passing the thread over reels and twisting it upon itself. The number of turns of twist put in at this point has an important bearing upon the quality of the silk reeled, as the less turns put in the faster the silk can be reeled and the greater the production of the filature; but also the lower will be the cohesion of the thread and the poorer its working qualities during manufacture. In order to gain production at low labor cost, however, unscrupulous filature managers will often sacrifice the possibilities of obtaining a silk of high cohesion and good weaving qualities, confident that this will escape detection in the conditioning houses and will not show up until the silk is in process in a mill many thousands of miles distant.

As it comes on the market raw silk is classified into several grades of quality. These grades are made by the inspectors in the central conditioning house in the country from which the silk came. The product of each filature is examined and graded in accordance with the inspector's judgment as to its quality. His judgment is based upon a visual examination. Japanese silk is divided into the greatest number of grades. The best is classified as Double Extra or Crack Double Extra; then follows Extra; Best No. 1 to Extra; Best No. 1; No. 1; No. 1 to 1½; No. 1½; No. 1½ to 2; No. 2. These grades denote certain physical and structural qualities of the raw silk, such as luster, evenness, cohesion, etc. Those silks judged by the inspector as a results of his visual examination to have in the highest degree those qualities most desired by the manufacturer are placed in the highest grades and

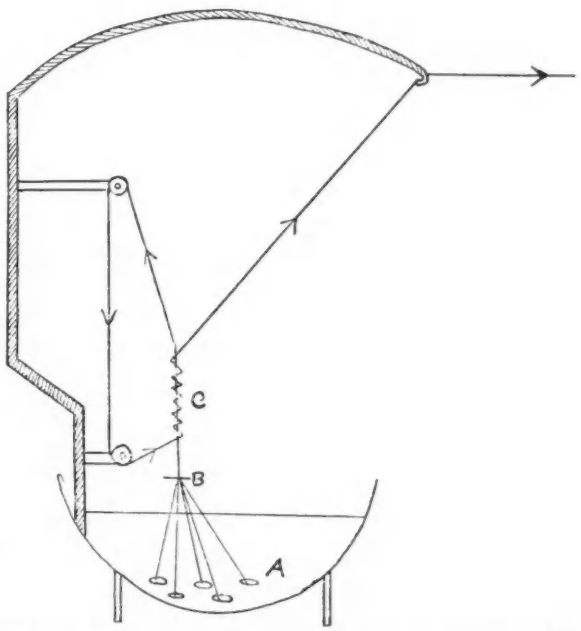

FIG. 1.—*(A) Cocoons immersed in basin; (B) Porcelain eye; (C) Point of twist of thread upon itself.*

cost the most money. The quality or grade of silk purchased depends largely upon the purpose for which the silk is to be used. For fine grade sheer hosiery nothing but a Crack Double Extra will serve, while for underwear made from two-thread tram an Extra or a Best No. 1 to Extra is employed by many large manufacturers. For certain types of dress goods the lowest qualities may be used in the filling of the cloth as the imperfections will be covered in the weaving.

Mills buying silk in quantity usually have a raw silk inspector who, when mechanical classification is not employed, examines the silk in each lot for the purpose of determining whether or not the silk is of a quality equal to the grade that it has been sold as. In making this examination the inspector is dependent upon the aid of touch and vision. No definite method is employed, each inspector being governed by private methods of his own. This sort of an inspection, when carried on near the filature at which the silk was reeled, may be a satisfactory method to employ as the inspector will have some knowledge of the cocoon crop from the district, the breed of the worms, and an intimate knowledge of the character of the supervision of the filature. But when this inspection is carried on, thousands of miles distant from the places where the silk was grown, the inspector becomes solely dependent upon his sense of touch and vision, and can only amplify these by certain crude tests, such as scratching with the finger nail, etc.; then the inspection of raw silk by these organoleptic methods becomes more or less of a farce. As can be readily understood, the grading of silk based upon any such method of examination as the above must be made solely upon the basis of physical properties, and it becomes impossible without the aid of a subsequent mechanical measurement to ascertain anything concerning the structural qualities of the raw silk, such as its evenness and cleanness. Most mill men will agree that for actual working conditions in the mill an accurate forecast of these structural properties is of far greater importance as affecting the throwing and weaving qualities of the lot than any examination covering the physical properties alone. Furthermore, inspectors grading silk by means of touch and vision unsupplemented by mechanical measurement will almost never agree upon the quality of any lot of silk grading below a Crack Double Extra.

Experiments begun by Rosenzweig in Italy and carried to a practical application by W. P. Seem in America have proven that the basic qualities of raw silk and their relative value can be accurately measured by mechanical means, and from the values arrived at by this measurement the silk in question can be accurately classified. The value of this scientific supplementation and the need for it in the silk industry is evident in view of the fact that there is sold every year in this country many times the quantity of Crack Double Extra and Double Extra silk as is actually reeled in Japan.

(Part II will appear in an early issue.)

CAUSTIC POTASH

Made by Electrolysis

[The following interesting information in regard to the uses of caustic potash in the textile industry is reprinted from a folder issued by Chemische Fabrik Griesheim-Elektron, Frankfort-on-Main.]

CAUSTIC potash is principally used for manufacturing soft soap. In most European countries and in the United States soft soap is an indispensable requisite in the household, as well as in industrial works, shipyards, laundries, and other establishments. In some countries, however, soft soap is not used to the extent it would be, were the nature and the properties of this type of soap sufficiently known.

Soft soap is made in a very simple way. Oils and fats are boiled together with caustic potash lye, to which a certain amount of ordinary potash may be added. The resultant product is soft soap, and this, filled into suitable packages direct from the boiler, is ready for use for all purposes.

Advantages

The great advantage which caustic potash has over caustic soda is that the yield with the former is about 20 per cent higher than with the latter. Thus 100 kilos of linseed oil treated with caustic potash would yield 235 kilos of soft soap, while 100 kilos of linseed oil treated with caustic soda would yield only 190 kilos of hard soap.

The advantage of soft soap over hard soap is apparent in cases where it is essential that the objects to be cleaned be rubbed with soap all over, or where it is necessary to mix soap with sand, sawdust or similar materials in order to materially enhance its cleansing effects. Soft soap dissolves readily and promptly in cold water.

Wool Scouring

Soft soap is indispensable in the treatment of wool, more especially in wool scouring, as it leaves the wool clean, soft and white, saves waste in carding by preventing brittleness of the fibers, enables it to retain more of its natural moisture, elasticity and tensile strength. Wool scoured with potash soap can be spun into finer counts of yarn than if the same quality of wool were scoured with soda soap.

Soaps made with soda have the tendency to make wool or flannels brittle and harsh to the touch, to cause heavy shrinkage, and to give the material a dullish color. This tendency is entirely obviated by caustic potash, which produces a soap that has little action on woolen fiber, and leaves the wool and flannel softer and more lustrous in appearance while preserving its elasticity.

Thorpe's Dictionary of Chemistry, published in England, says:

"Most of the soft soap made is used by woolen manufacturers for wool washing, fulling, scouring and sizing,

and there is no doubt that the best soap for these purposes is a genuine potash oil soap. Experience has shown that the presence of soda in any form is absolutely injurious to the fiber.

"Wool in its natural state is lubricated by suint, the natural oil or grease of the sheep which excretes through the skin and is found present in large quantities in the wool. This suint contains nearly 50 per cent of potash and scarcely a trace of soda.

"It is evident, therefore, that in discarding soda and using potash the woolen manufacturer follows the teaching of nature."

Again we quote from an American source, viz., from "A Historical and Descriptive Sketch," issued some years ago by one of the most progressive worsted manufacturers of the country concerning washing:

"The utmost care must be used in the washing of the wool, not only to save loss of material, but to produce uniform color as well as softness and loftiness of staple.

"The experience of the ——— Mill accords with that of the best spinners in England, who agree that a potash olive oil soap is necessary to give the best results."

Antonie Sansone, late director of the School of Dyeing at the Manchester Technical School, England, says in regard to washing wool:

"A potash soap should always be used if it is desired to get the wool in the best possible condition for carding or spinning with a minimum loss of weight in washing. The use of potash instead of soda soap for this purpose cannot be too strongly insisted upon. It is a very penny wise and pound foolish proceeding to use soda soap or soda in any form for washing wool. The difference between cost of potash and potash soap, as compared with soda and soda soap, is not one-twentieth part of the loss incurred by the inferior handle and condition of the wool, and the greater loss in weight when soda is used; this is no theory but an established fact, which has been verified by many large wool washers and worsted spinners, both in England, Germany and the United States."

There are numerous other uses of caustic potash, resulting from experiments in the various industrial branches. It is used for softening and purifying water, and as a boiler cleaner. It is well adapted to be used either by itself or in connection with other detergent materials, for scouring all sorts of articles where the action of caustic soda is too keen or that of carbonate of soda not strong enough; thus it is found extremely useful in cleaning greasy materials and vessels.

Quality

Caustic potash obtained through causticizing the ordinary vegetable ash gives uncertain results. Whatever the result, it yields a comparatively low percentage of real hydrate of potash, containing a series of compounds more or less worthless and some even detrimental to the saponifying process.

Caustic potash electrolytically made from pure potassium chloride yields the highest percentage of hydrate of absolutely reliable and uniform composition.

The soap industry within reasonable distance of the producing centers is supplied with caustic potash in the liquid form of the uniform strength of 50 deg. Be. For the soap industry abroad the caustic potash is supplied in its concentrated form, i. e., by the evaporation of the liquid into a solid mass. This is packed in iron drums.

The accompanying table supplies the necessary directions for dissolving the solid into a caustic potash lye of any causticity desired.

As buyers have to pay transport charges and import duty on bulk, it is obvious that these are much heavier on an article containing 60 per cent KOH than on an article containing 90 to 92 per cent KOH, the bulk in both cases being the same, and the KOH being the only really valuable saponifying matter.

The price of a low grade article, while it may sound cheap, is often comparatively high when it is considered that the material contains a large proportion of worthless by-products, a high percentage of the cheaper soda and an increased quantity of water.

The following table shows the quantities of water which have to be added to 1 cwt. (equal to 7¼ gallons) of liquid caustic potash 50 deg. Be., or to 1 cwt. of solid caustic potash 90 to 92 per cent, in order to obtain a lye of a certain specific gravity (degrees Be.) and a corresponding percentage of KOH (strength):

For obtaining Liquid Caustic Potash of °Be.	Strength, per cent KOH.	—Quantity of Water to Be Added— To 1 cwt. (equal to 7¼ gal.) of Liquid 50° Be.	To 1 cwt., Solid 90/92 per cent.	(65.4 liter) To 100 kgs Liquid 50° Be.	To 100 kgs. Solid 90/92%
		Gallons	Gallons	Kilos (liter)	Kilos (liter)
15	12.0	35½	72½	318	647
16	12.9	32½	67	290	598
17	13.8	29½	62	264	553
18	14.7	27	57½	241	512
19	15.6	25	53½	221	476
20	16.5	23	49½	205	444
21	17.4	21	46½	189	416
22	18.4	19½	43½	173	388
23	19.4	18	40½	159	363
24	20.4	16½	38	146	340
25	21.4	15	36	134	320
26	22.5	14	33½	124	300
27	23.5	13	31½	115	283
28	24.5	12	30	106	267
29	25.6	11	28	97	252
30	26.6	10	26½	89	238

Example—In order to obtain a lye of 23 deg. Be. which would contain 19.4 per cent KOH, add 18 gallons of water to 1 cwt. (7¼ gallons) of liquid caustic potash, 50 deg. Be., or add 40¼ gallons of water to 1 cwt. solid caustic potash 90 to 92 per cent.

The corresponding figures in kilos are: Add 159 kgs. of water to 100 kgs. (65.41) liquid caustic potash 50 deg. Be., or add 363 kgs. of water to solid caustic potash 90 to 92 per cent.

A certain amount of high strength carbonate of potash should be added to the caustic potash lye in order to obtain a soft soap of superior quality and appearance.

For manufacturing soft soap from linseed and/or cotton-seed oil, add about 12 to 16 kilos 96 to 98 per cent carbonate of potash to 100 kgs. liquid caustic potash 50 deg. Be. This should give satisfactory results.

During warm weather less carbonate of potash should be used than during the winter months.

Dyeing Acetate Silk

Part XII

(*Continued from page 521*)

The Diazo Solamines on Acetate Silk—Methods and Formulas for Two-Color Effects on Celanese Unions —SRA Dyes on Hosiery—Diazo Solamines on Celanese-Cotton Hosiery

By CHAS. E. MULLIN, M. Sc., F. A. I. C.

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Method No. 81: The Diazo Solamines on Acetate Silk. —The SRA Diazo Solamines are sulforicinoleic acid soluble amino compounds capable of subsequent diazotization and development; they are yellow when dyed direct, but give a variety of shades when diazotized and developed. They are all applied in about the same manner as the direct dyeing SRA dyes, in a bath containing about 2 grams of soap per liter, and the goods entered cold. After 10 minutes the temperature is raised to 45 deg. Cent. (113 deg. Fahr.), in another 10 minutes it is raised to 65 deg. Cent. (149 deg. Fahr.), and held there for forty-five minutes.

Method No. 81A: They are then rinsed in warm followed with cold water and diazotized in a cold bath containing up to 17 per cent of 28 deg. Tw. of hydrochloric acid and as much as 5 per cent of sodium nitrite for thirty minutes. After rinsing they are ready for developing.

Method No. 81B: The developing bath in the case of Naphthol AS and *B*-hydroxynaphthoic acid is prepared by dissolving the acid in a little water containing about one-third or one-fourth of the weight of caustic soda as of the developer to be dissolved. Dimethylaniline is dissolved in Turkey Red oil. These are added to the developing bath containing 5 per cent on the weight of the acetate silk of freshly dissolved glue. Then add 5 per cent of formic acid, which gives a milky bath, and enter the acetate silk cold for 10 minutes, after which the temperature is raised to 45 deg. Cent. (113 deg. Fahr.) for another 10 minutes, and finally to 65 deg. Cent. (149 deg. Fahr.) for about 45 minutes. The developing bath must be slightly acid and hot, about 65 deg. Cent., except in the case of dimethylaniline which is coupled cold. Only SRA Blue I and II are altered in shade by the diazotizing and development, so that all of the other SRA direct dyes may be used in the same dye bath with the Solamines. While the SRA Diazo Solamines themselves may be mixed in the dye bath, it is not recommended to mix the developers together. In certain cases where the cotton dye in acetate silk-cotton unions is to be diazotized and developed, it may be treated in the same baths as the Solamine colors. It usually requires about 25 per cent of SRA Diazo Solamine 10 per cent paste to give a good heavy solid shade.

The following formula for dyeing Deep Nigger will illustrate the process. The dye bath is prepared as follows:

Formula No. 81

15 per cent SRA Diazo Solamine I paste and
6 per cent SRA Pure Yellow I paste.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-quarter hour.

Rinse in warm and then with cold water and diazotize for 30 minutes cold in a bath containing:

5 per cent Sodium nitrite, and
17 per cent of 28 deg. Tw. hydrochloric acid.

Rinse and develop in a bath prepared by dissolving

3 per cent Naphthol AS in
0.5 Caustic soda in boiling water.

Add this to the bath containing

5 per cent of glue in solution and then add
5 per cent of formic acid.

Enter the material cold and develop for 1 hour at 60 deg. Cent. (140 deg. Fahr.). Rinse the goods well and soap for 10 minutes in a solution containing one-eighth of 1 per cent of soap at 45 deg. Cent. (113 deg. Fahr.).

It is possible that in dyeing acetate silk-cotton unions black with SRA Diazo Solamine III, and a developing cotton direct black, that the Solamine III and the direct black could be applied in the same bath and diazotized and developed together to give a solid black. If the acetate silk union is to be cross-dyed black using a

Solamine, the following formula will give very good results:

Formula No. S2

20 per cent Diazo Solamine III paste.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one hour. Diazotize with

2.5 per cent Sodium Nitrite and

8 per cent of 28 deg. hydrochloric acid for one-half hour cold, rinse and develop in a bath containing

2 per cent *B*-hydroxynaphthoic acid,
0.5 per cent Caustic soda,
2.5 per cent Glue and
2.5 per cent Formic acid.

Enter cold and dye at 60 deg. Cent. (140 deg. Fahr.) for one hour. Soap for ten minutes at 45 deg. Cent. (113 deg. Fahr.) in a bath containing 2.5 grams per liter of olive oil soap and cross-dye in a bath containing

4 per cent CR Chlorazol Black GF,
0.25 per cent Chlorazol Fast Red K and
20 per cent of salt.

Enter at 45 deg. Cent. (113 deg. Fahr.) and dye at 80 deg. Cent. (176 deg. Fahr.) for one hour; then rinse well.

Formula No. S3

A solid navy may be obtained with:

5.0 per cent Diazo Solamine III paste.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-quarter hours.

Diazotized as above Formula No. S2, and developed in a bath containing

1.5 per cent Naphthol AS,
0.5 per cent Caustic Soda,
2.5 per cent Glue,
2.5 per cent Formic Acid,
1.5 c.c. per liter of 40 per cent formaldehyde, and
20 grams per liter of salt or zinc nitrite.

Enter cold and develop one hour at 60 deg. Cent. (140 deg. Fahr), soap as in Formula No. S2 and cross-dye the cotton in a dye bath containing

2 per cent Chlorazol Brilliant Black BXX, and
15 per cent of salt.

Enter at 45 deg. Cent. (113 deg. Fahr.) and dye at 75 Cent. (167 Fahr.) for one hour.

Formula No. S4

Nigger is obtained with:

7.5 per cent Diazo Solamine I paste,
5.0 per cent Pure Yellow I paste.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-quarter hours. Rinse and diazotize as in Formula No. S2. Then develop in a bath prepared with

1.5 per cent Naphthol AS,
0.5 per cent Caustic Soda,
2.5 per cent Glue, and
2.5 per cent Formic Acid.

Enter cold and dye at 60 deg. Cent. (140 deg. Fahr.) one hour. Rinse and soap as in Formula No. S2, and cross-dye the cotton with

1.50 per cent Chlorazol Brown RD,
0.15 per cent Chlorazol Brown RK, and
15.00 per cent of Salt.

Enter at 45 deg. Cent. (113 deg. Fahr.) and dye at 80 deg. Cent. (176 deg. Fahr.) for one hour.

Method No. 82: Two-Color Effects on Celanese Unions with the Solamines.—For two-color effects the developed Solamines are only used for Dark Nigger Browns, Navy Blues and Blacks, cross-dyeing the cotton afterward. The *B*-hydroxynaphthoic acid and Naphthol AS developers are prepared in the same manner as in Methods No. 81B and Formula No. S1, and the diazotizing is carried out in a bath prepared according to Formula No. S2. The following formulas will serve as examples of this process:

Formula No. SU1—Celanese Nigger Brown, Cotton Orange

8 per cent Diazo Solamine I paste,
4 per cent SRA Pure Yellow I.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-quarter hours. Rinse well, diazotize as above, rinse again and develop with

2 per cent Naphthol AS,
0.5 per cent Soda,
2.5 per cent Glue, and
2.5 per cent Formic Acid.

Enter cold and develop at 60 deg. Cent. (140 deg. Fahr.) for one hour, soap for ten minutes at 45 deg. Cent. (113 deg. Fahr.) in a bath containing 1.25 g. per liter of olive oil soap, and cross-dye in a fresh bath with

0.4 per cent CR Chlorazol Fast Orange R and
10 per cent of salt.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and one-quarter hours.

Formula No. SU2—Celanese Navy, Cotton Daffodil

4.0 per cent Solamine III paste.

Dye as in Formula No. SU1, and diazotize as in Formula No. S2, rinse again and develop with

1.5 per cent Naphthol AS,
0.5 per cent Caustic Soda,
2.5 per cent Glue,
2.5 Formic Acid,
1.5 per cent c.c. per liter of salt or zinc nitrite.

Develop as in Formula No. SU1, soap according to the same formula, and cross-dye the cotton or artificial silk with

0.4 per cent Chrysophenine, and
10 per cent Salt.

Enter cold and dye at 60 deg. Cent. (140 deg. Fahr.) for one hour.

Formula No. SU3—Celanese Black, Cotton Light Violet

20 per cent Diazo Solamine II paste.

Dye as in Formula No. SU1, diazotize as in Formula No. S2, and develop with

4 per cent *B*-hydroxynaphthoic acid,
1 per cent Caustic Soda,

5 per cent Glue, and
5 per cent Formic Acid.

Develop as in Formula No. SU1, soap and cross-dye the cotton in a fresh bath with

0.3 per cent CR Chlorazol Violet R, and
10 per cent of Salt.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one hour.

Method No. 83: SRA Dyes on Celanese-Cotton Hosiery.—In applying the SRA dyes to Celanese union hosiery, it has been recommended to scour them as in Method No. 2, and then allow them to remain in the scouring bath overnight. For light shades they may be bleached as in Method No. 10 and antichlored as in Method No. 13. Small lots should be dyed by hand but larger lots may be dyed either in a revolving drum or the paddle machine. Copper or Monel metal is advisable. The same general directions regarding the addition of dyestuff to the dye bath, etc., are followed as in dyeing other Celanese unions by Method No. 78. The following are examples of formulas in successful operation:

Formula No. HU1—Beige

0.70 per cent SRA Blue I paste,
0.50 per cent SRA Orange I paste,
0.90 per cent SRA Pure Yellow I paste,
0.125 per cent CR Chlorazol Brown PB,
0.10 per cent CR Chlorazol Orange AG,
0.01 per cent CR Chlorazol Fast Orange R, and
10 per cent of Salt.

Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one and one-half hours.

Formula No. HU2—Putty

1.25 per cent SRA Blue I paste,
0.10 per cent SRA Orange I paste,
1.00 per cent SRA Pure Yellow paste,
0.15 per cent CR Chlorazol Drab RH,
0.025 per cent Chlorazol Yellow G, and
10 per cent of Salt.

Dye as in Formula No. HU1.

Formula No. HU3—Light Gray

1.25 per cent SRA Blue I paste,
0.30 per cent SRA Orange I paste,
0.25 per cent SRA Pure Yellow paste,
0.10 per cent CR Chlorazol Fast Gray, and
5.00 per cent of Salt.

Enter cold and dye at 65 deg. Cent. (14 deg. Fahr.) for one and one-half hours.

Formula No. HU4—Mole

6.00 per cent SRA Blue I paste,
1.00 per cent SRA Orange I paste,
2.00 per cent SRA Pure Yellow I paste,
0.50 per cent CR Chlorazol Drab RH,
0.35 per cent CR Chlorazol Brown RD, and
15.00 per cent of Salt.

Dye as in Formula No. HU1.

Formula No. HU5—Flame

0.20 per cent SRA Blue I paste,
3.50 per cent SRA Orange I paste,
1.00 per cent SRA Red III paste,
1.20 per cent Chlorazol Brown RK,
0.10 per cent Chlorazol Brown M, and
10.00 per cent of Salt.

Dye as in Formula No. HU1.

Formula No. HU6—Tan

4.00 per cent SRA Blue I paste,
1.10 per cent SRA Orange I paste,
1.50 SRA Pure Yellow I paste,
0.30 per cent CR Chlorazol Drab RH,
0.25 per cent Chlorazol Brown RK, and
10.00 per cent of Salt.

Dye as in Formula No. HU1.

Formula No. HU7—Dark Brown

10.00 per cent SRA Blue I paste,
2.00 per cent SRA Orange I paste,
2.00 per cent SRA Pure Yellow I paste,
1.20 per cent Chlorazol Brown RD,
0.15 per cent Chlorazol Brown RK, and
20.00 per cent of Salt.

Dye as in Formula No. HU1.

Method No. 84: Diazo Solamines on Celanese-Cotton Hosiery.—The Diazo Solamines are also applied to Celanese-cotton union hosiery by somewhat the same process as Method No. 82. The following two formulas are useful for Navy Blue and Black:

Formula No. HUS1—Navy Blue

7.5 per cent Diazo Solamine III.

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one and a quarter hours, rinse and diazotize as in Formula No. S2, under Method No. 81, rinse again and develop with Naphthol AS, as in Formula No. SU2, under Method No. 82, soap according to Formula No. SU1, and cross-dye the cotton with

2 per cent Chlorazol Brilliant Black BXX, and
15 per cent of Salt.

Enter cold and dye at 75 deg. Cent. (167 deg. Fahr.) for one hour.

Formula No. HUS2—Black

25 per cent Diazo Solamine III.

Dye and diazotize just as in Formula No. HUS1 above, and develop with

3.00 per cent B-hydroxynaphthoic acid,
1.00 per cent Caustic Soda,
5.00 per cent Glue, and
5.00 per cent Formic acid.

Enter cold and develop at 60 deg. Cent. (140 deg. Fahr.) for one hour. Soap as in Formula No. SU1, and cross-dye the cotton with

4.00 per cent CR Chlorazol Black GF,
0.25 per cent Chlorazol Fast Red K, and
20 to 25 per cent of salt.

(*Concluded on page 577*)

Proceedings of the American Association of Textile Chemists and Colorists

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SUMMER MEETING OF THE SOUTHERN SECTION

The summer meeting of the Southern Section of the American Association of Textile Chemists and Colorists was held July 18, 1925, at the George Vanderbilt Hotel, Asheville, N. C. Over sixty members and guests were present. The meeting was opened with dinner; H. M. Chase, Chairman, presided.

The following papers were read: "The Reduction of Vat Colors, Including Indigo," by Malcolm Mackenzie, Sandoz Chemical Works; "Multi-Colored Effects in Hosiery," by Joseph H. Zens, General Manager of the United Hosiery Mills Corporation, Chattanooga, Tenn. These papers are published herewith.

Upon motion of Mr. Stone the Southern Section went on record as favorable to dividing the present Section into two parts, which would correspond, as far as possible, to a geographical division of the South. The Secretary was instructed to notify the National Secretary of this resolution and to request the National Secretary to secure permission from the Council for such a division, together with necessary information to carry this matter through.

Respectfully submitted,

HARRY W. ORMAND, Secretary.

The Reduction of Vat Colors, Including Indigo

By MALCOLM MACKENZIE,
Sandoz Chemical Works

The vat dyestuffs are so named because they, being insoluble compounds, and having the same dyeing characteristics as Indigo, have to be reduced to a leuco state before they are soluble and have any affinity for the fiber; and in olden times Indigo was reduced in a deep, narrow vat, the depth to allow for the sludge which would settle out from the reducing agents used, and the narrowness to prevent oxidation of the dyeing liquor, hence the popular name "vat colors."

Natural Indigo, the first of the so-called vat colors, has been in use since long before the Christian era, having been used in Egypt and India, although it was not introduced into Europe until the sixteenth century. It has always been considered one of the most important and valuable of the coloring matters, on account of its fastness to light and washing and beauty of shade, as well as its low cost; there is, in all probability, more Indigo used than any other blue dyestuff.

Natural Indigo at its best was far from being satisfactory, there were so many different types, each varying in its indigotin content and its purity; thus, Java Indigo yielded from 65 to 75 per cent indigotin, Bengal Indigo from 60 to 65 per cent, Madras Indigo from 30 to 40 per cent; there were many other grades, but these were perhaps the best known. Bengal Indigo, while having a lower indigotin yield than Java, was preferred by most users, as it seemed to be a purer product.

Research was begun by Dr. Baeyer, of Munich, in 1865, to make Indigo synthetically; this he accom-

plished after twenty years' endeavor, but the cost was prohibitive, his product costing in the neighborhood of $25 per pound to produce. The large dyestuff manufacturers of Germany worked on the problem until it was finally put on the market in 1896. The artificial product readily supplanted the natural Indigo, because it was so much cheaper, of a standard strength, and could be procured in a convenient paste which eliminated the necessity and inconvenience of all grinding. Synthetic Indigo is identically of the same chemical construction as the natural product; in fact, it is impossible to detect any difference in them when testing out dyed material. Indigo itself is an insoluble dyestuff and cannot be applied to the fiber until it has been reduced or converted to its leuco state; then it is not only soluble, but has an affinity for the fiber and goes on readily and upon striking the air is readily oxidized back to its insoluble state. In this way an insoluble color is precipitated upon the fiber that is remarkably fast. The reduction may be carried out by several different methods.

The Fermentation Vat

The fermentation vat was perhaps the first method used for reducing Indigo, the grains, starches or syrups used in fermenting formed nascent hydrogen, converting the Indigo into Indigo White and the caustic potash present readily dissolved it. This vat was very intricate and hard to manipulate, so is rarely used to-day except on certain export trade where the goods are required to have the peculiar odor imparted by this vat.

The Copperas Vat

The copperas vat was made up with quicklime, copperas and Indigo; the lime acting upon the ferrous sulphate broke it up into calcium sulphate and ferrous hydrate; the latter decomposed the water in the vat, liberating hydrogen which reduced the Indigo. A vat of this type was usually set the night before and allowed to reduce over night before using.

50 pounds Indigo 20% paste
40 pounds copperas
50 pounds lime

The lime is made into a milk of lime with an addition of water, then added to the vat. The Indigo is then added and the vat is well stirred before adding the copperas, which has been previously dissolved in warm water. A vat is in good condition when after the sediment has settled the surface is covered with a coppery blue film or "flurry," and thick, dark blue veins are formed upon raking; the color of the vat should then be of a brownish yellow or amber appearance. If the vat is greenish, it shows that it has not reduced enough and more copperas should be added; if too blue, it is not alkaline enough and more lime is needed. This type of vat was not in general favor, as it had a great deal of sediment and required most careful watching.

The Lime Zinc Vat

The lime zinc vat was very similar to the copperas vat in its working, except that there was less sediment and it was much more easily handled. Zinc in the presence of lime and Indigo decomposes water and combines with its oxygen; the liberated hydrogen reduces the Indigo, which is at once dissolved by the excess of lime present.

50 pounds Indigo 20% paste
6 pounds zinc
20 pounds lime

The lime should be slacked before adding to the vat, then add the Indigo. The zinc is well stirred up with about five gallons of water, and the vat well stirred up and allowed to reduce over night; an occasional stirring will help to make the reduction more complete. The appearance of the vat is very similar to the copperas method. Great care should be taken that there is not an excess of zinc, as this would cause the vat to be muddy and frothy.

The Zinc Bisulphate Soda Vat

This vat is in quite common use to-day in many of the smaller mills in the Carolinas, where short chain warps are dyed. The main disadvantage is the amount of sediment that it contains, although this can easily be overcome by filtering the hydrosulphite liquid before adding to the vat. The smaller mills referred to, however, are not filtering; the vat is prepared by first adding the caustic soda, then the Indigo paste, and finally the bisulphite of soda and zinc dust. Often the color is reduced over night in a small container, and one-half added to the vat for the first run. The other half is added for the second run, and then the warps are given a free run and well washed.

The Hydrosulphite Vat

Since the advent of sodium hydrosulphite as a powder, this has largely superseded all other reducing

agents owing to its stability and cleanliness in handling.

The most modern method of dyeing Indigo to-day is on long chain warps in a continuous dyeing machine, where the warps are taken from the shell beam, dyed, dried and coiled ready for beaming, all in one operation. This method was originated by the Cocker Machine Company, of Gastonia, N. C., and has been installed in many of the most modern plants. One of the new mills in North Carolina has recently installed a two-unit equipment with a capacity for dyeing 38,000 pounds of Indigo dyed yarn per day, each machine dyeing two sets daily, each set consisting of twenty-five warps, each warp weighing 380 pounds, a total of 9,500 pounds.

The dyeing system proper consists of a series of seven boxes, the first a boil-out box, the second for rinsing; the next three are dyeing vats, and the last two are for washing and softening. While there are only three vats, the yarn is given six separate immersions with a skying in between; i. e., the yarn is carried halfway through the first vat, then run through a pair of squeeze rolls and skied on a series of rolls built above the machine, then brought back and carried through the second half of the first vat and again skied. This operation is repeated again through the second and third vats. At a speed of twenty yards per minute, the yarn is in the dye liquor one and one-quarter minutes per immersion, or a total actual dyeing time of seven and one-half minutes; the skying intervals are of two minutes each, with the exception of the last, which is of three; or, allowing twelve minutes for oxidation, a set of 6,000 yards can be dyed in five hours.

The third vat has twice as much dyestuff in it as either the first or second; for instance, to dye a 10 per cent shade, sufficient color is put into the first and second vats to dye a 2½ per cent shade; the last vat, being twice as strong, would have been sufficient color to dye a 5 per cent shade, so that a passage through the three vats would be the equivalent of 10 per cent dyeing; with the vats so arranged, different strength dyeing can be made at the same time by simply skipping over the vats that are not to be used and going direct to the washing and softening boxes at the rear of the machine.

To start a series of vats for a 10 per cent shade, the following amounts of material are used based on a vat with the capacity of 3,000 gallons:

1,392 pounds Indigo 20% paste
236 pounds ground caustic or 17% of the amount of Indigo used
181 pounds hydrosulphite or 13% of the amount of Indigo used

The above amounts are used on the first and second vats, and each should give the equivalent of a 2½ per cent dyeing; the third and last vat has exactly twice as much of each ingredient and would equal a 5 per cent shade. All caustic and hydrosulphite used should be previously dissolved, but all the figures here given are for the dry chemicals. A stock solution is also made up of—

500 pounds Indigo 20% paste
85 pounds ground caustic
65 pounds hydrosulphite powder

This can be reduced in 250 gallons so that each gallon contains 2 pounds of Indigo. A "springer solution" of caustic and hydrosulphite is also made. The bath then being ready to start, the Indigo is fed on every fifteen minutes, and with it an amount of this springer solution, which is composed of 12½ per cent hydrosulphite and 14 per cent caustic based on the amount of Indigo added to the vats. Thus, while 17 per cent of caustic and 13 per cent of hydrosulphite will reduce 100 pounds of Indigo in the starch vat, an addition of 14 per cent of caustic and 12½ per cent of hydrosulphite has to be added to the bath during the dyeing so that the actual amounts used are 31 per cent of caustic and 25½ per cent of hydrosulphite on the Indigo used.

The older method was to dye in a single vat, giving four runs, or to use a series of two vats so arranged that the yarn had a skying between the first and second vat; the yarn was then given two runs.

The Indigo is previously reduced in a large tank, using 250 gallons for 500 pounds Indigo paste, 125 pounds caustic or 25 per cent of the amount of Indigo used, and 80 pounds hydrosulphite or 16 per cent of the amount of Indigo used. Each gallon contains 2 pounds of Indigo.

Each vat has a capacity of 1,600 gallons, and to set for a 10 per cent shade, 110 gallons of the reduced Indigo, equalling 220 pounds Indigo 20 per cent paste, is then added with 20 pounds hydrosulphite. The vat should always have this 220 pounds in it, so in order to dye a set of 2,400 pounds, 240 pounds of Indigo would be needed; this is divided into four parts; and 60 pounds—or 30 gallons of the reduced Indigo—is added to each of the two vats, also 9½ pounds hydrosulphite into each vat, or an equivalent of 16 per cent of the amount of Indigo used; this addition of hydrosulphite tends to keep the Indigo in a reduced state throughout the run, and nothing further is added until the run is completed. The other half of the Indigo is added with an additional 9½ pounds hydrosulphite after the first run, and the vats are then ready for the second and last run. When the vat is in proper condition it should stand at 5 deg. Tw.; the caustic used

then in reducing the Indigo feed liquor can be cut down to 22 per cent of the amount of Indigo.

In plants where a great amount of hydrosulphite is used, a solution of hydrosulphite from SO_2 gas is often made. The SO_2 gas is slowly fed into an agitator containing a cooled mixture of zinc dust, caustic soda and soda ash, and is then filtered.

The main disadvantage with a liquid solution of hydrosulphite is that the product is not stable, and should be used the same day that it is made.

Vat Colors

After the chemical structure of Indigo had been definitely established, attempts were made to prepare an anthracene analogue; in this way Indanthrene was discovered and put on the market in 1901. This was not the result, however, of a general demand for a series of vat dyes. The discovery of Indanthrene was soon followed by a general line of colors made from an anthraquinone base. Similar progress was made from derivatives of Indigo, so that a fairly complete range of indigoid base colors was soon available. In 1906 a sulphur analogue of Indigo, Thioindigo, was discovered by Friedlander; this supplied the reds that had hitherto been missing, and made practically a complete range of colors that could be dyed from the vat process. Some are faster in one respect than another, but there are so many colors to choose from to-day that one can select a range to fit almost any requirement. The anthraquinone group is best perhaps for all-round fastness; these comprise the Indanthrenes, Cibanones, Algols, Ponsols, Akcothrenes and the Anthrenes. The indigoid group—though not as fast in general to light and bleaching—are good. These comprise the Cibas, Helindones and Thioindigoes. The Hydron colors, though dyed similarly in the vat, are of a different structure from either of the above two, being derived from carbazol; they, too, possess good fastness qualities.

Vat colors are divided into three groups for dyeing. Some dye best cold, others warm, from 100 to 120 deg. Fahr., and the hot dyeing group that range from 120 to 160 deg. Fahr. Indanthrene Black is an exception, and dyes best at 176 deg. Fahr.

The reduction is carried out identically in the same manner as with Indigo, either in the vat or in a separate container, except that the amounts of caustic may vary according to the type used. The dyeing of the vat colors may be divided into three distinct processes:

(1) The preparation or reduction of the color;
(2) The dyeing itself which takes place in the vat;
(3) The development or oxidation process which produces the true shade.

The cold dyeing colors are the most soluble, and for this reason require considerably less caustic, although the amount of hydro required remains the same. On medium and dark shades an addition of Glauber salt is advantageous in exhausting the bath, and this should always be dissolved and added to the bath in solution. When common salt is used, only one-half the amount is required as of Glauber salt.

The warm dyeing colors require more caustic than the cold dyeing group, but not as much as those in the hot dyeing group and only about half as much Glauber salt.

The hot dyeing group, while requiring a greater amount of caustic than either of the cold or warm dyeing colors, do not require any salt whatever.

When dyeing compound shades care should be used to select dyestuffs that have the same dyeing properties; that is, where the temperature for dyeing and the amount of caustic required are about the same. Some colors dye well by all three methods, such as:

"Indanthrene, Anthrene or Ponsol Golden Orange G—Indanthrene, Anthrene or Ponsol Golden Orange RRT, Indanthrene or Anthrene Blue GCD and Ponsol Blue GD—Indanthrene or Algol Olive R."

In dyeing compound shades, where a variety of the different groups of colors must be used, it is advisable to reduce each color separately at its own reducing temperature, then add to the vat and dye at the maximum temperature allowable for the coolest dyeing color used. When using the powder brands it is essential that they be thoroughly wet out in order to get the full value of the dyestuff. This can be done by moistening with alcohol and soluble oil and a thorough stirring; some brands wet out easily by simply adding cold water and agitating under a small steam pipe. The powder brands should be allowed to reduce a little longer than the ordinary pastes. Colors that exhaust equally—especially in long chain warp and piece dyeing—are very essential, as otherwise it is very difficult to prevent uneven dyeings. In some particular cases this cannot be avoided, then care must be taken in the feeding on to be sure that more of the quick exhausting dyestuff is added than the slower one.

In the dyeing of short chain warps, little difficulty is met with as regards leveling, especially if the yarn is given four runs. The dyestuff should be reduced in four equal portions, and the first portion added to the vat which has previously been sharpened with 1 pound of caustic and 12 ounces of hydrosulphite per 100 gallons. At the end of the second run, a very good idea

can be formed as to whether an addition of color will be needed to procure the proper shade; or, an end may be dipped in the vat before beginning the third run, to see whether the depth of shade will be sufficient. Unfortunately, there is no exact method of determining just how much hydrosulphite is left in the bath after the first run, and this can only be estimated; the alkalinity is also hard to ascertain on account of the coloring matter in the bath.

Hot dyeing colors usually require 4 to 5 pounds of caustic per 100 gallons of liquor used; the hydrosulphite required varies from 1 to 1½ pounds for light shades of 10 per cent and less; 2 to 2½ pounds for medium shades, and for dark shades of over 20 per cent up to 4 pounds per 100 gallons. The warm and cold dyeing groups only require one-half the above amounts of caustic, or from 1½ to 2 pounds of caustic per 100 gallons, the hydrosulphite used being about the same. The warm dyeing group needs from 10 to 25 pounds of Glauber salt, previously dissolved, depending upon the depth of shade desired, and the cold dyeing group about twice this amount of salt. Water is a most important item in the dyeing of the vat colors, and should be as soft as possible. Hard water should be corrected by an addition of soda ash before adding any color to the bath; any scum formed should be carefully skimmed off.

Oxidation and Development

Almost equal in importance to the reduction is the oxidation and development of the dyeing, for only in this way can the true shade be brought out. In warp or skein dyeing, where the air can easily get to all parts of the lot, there is little or no difficulty with the oxidizing, but in tube or beam dyeing machines it is advisable to add a small amount of perborate of soda to the first rinse; the oxygen evolved will decompose the free hydrosulphite left in the yarn and thus tend to prevent streaks; or a weak solution of sulphuric acid may be used instead and thus by neutralizing any free caustic the same results are obtained. It is very essential that the dyeings be given a thorough boiling in a soap solution.

In the development of Indanthrene Black 2B, where the dyeing comes out green, the yarn should be thoroughly cooled and then treated for twenty to thirty minutes in a solution of sodium hypochlorite made either from chloride of lime or liquid chlorine, then washed, scoured and again well rinsed in order to develop a full black shade.

Indanthrene Blue 5G, or Algol Blue 3G, and Indanthrene Brill. Violet RK or Algol Brill. Violet R, must be acidulated before soaping with a weak sulphuric acid solution, using about 1 pound of acid to the 100 gallons of water.

Indanthrene, Ponsol and Anthrene Yellow G oxidize very slowly, so after thoroughly rinsing it is advisable to give an after-treatment with 2 per cent of bichromate of potash or soda and 2 per cent of acetic acid at the boil; then, after a thorough rinsing, there should be a soaping at the boil.

Many of the colors have individual peculiarities and each color should be considered separately. Anthrene Jade Green should be reduced at about 110 deg. Fahr. and dyed at a temperature not exceeding 120 deg. Fahr.; if the temperature is allowed to rise above this limit, the shade has a tendency to go bluer and flatter. Ponsol Violet RRD also will become considerably bluer if the temperature exceeds 120 deg.

The properties of some of the colors change when used in combination; just what reaction takes place has not been definitely settled, but it is generally admitted that such a reaction does occur; e. g., Indanthrene Blue GCD has excellent fastness to light when dyed as a self-shade. Anthraflavone GC as a self-shade is rated as of poor fastness to light, yet when these two are dyed in combination, bright greens of excellent fastness to light are obtained. If a high percentage of Anthraflavone is used the fastness is not as good, but the peculiarity is that it is the blue that fades out the more.

Indanthrene Blue GCD, after chemicking or a severe soaping, may have a slightly reddish cast, but by giving a run through a weak hydrosulphite bath the true shade is again restored.

In the dyeing of skein yarn, the yarn should be thoroughly wet out by boiling in a kier, or some other suitable method, and hydroextracted; then put onto straight wooden sticks. Care should be taken that each stick contains the same amount of yarn. The yarn should be dyed at the rate of 240 gallons to 100 pounds of yarn, or a ratio of 20:1. The bath should be previously sharpened with 1 pound each of caustic and hydrosulphite. The dyestuff is best reduced in a separate container; a barrel is perhaps the cheapest and most convenient, as separate ones can be kept for each color. The barrel is filled with water heated to the required temperature, and the caustic, previously dissolved, stirred in; the color is then added and the contents of the barrel well stirred. Lastly, the hydrosulphite powder is slowly strewn in and then let stand for about fifteen minutes, until the reduction is completed; this can easily be told by the color and clarity of the solution. The reduced color is then strained through a fine sieve or cotton cloth into the dye vat, previously heated to the required temperature; the bath is then well raked or stirred and the yarn en-

tered. The yarn should be turned as frequently as possible to insure level dyeing.

In dyeing pale shades, or when using dyestuffs that have a tendency to exhaust too rapidly, thus causing unevenness, an excess of caustic and an addition of 5 per cent of animal glue, well dissolved, helps considerably to retard the dyestuff. Again, if using hot dyeing colors—if the yarn is entered into a cold vat and the temperature gradually increased, this will help to hold back the color somewhat.

Mercerized cotton and rayon have a greater affinity for the dyestuff than ordinary cotton; in skein-dyeing these materials, besides the above precautions, the color is usually applied in three parts, and great care should be used in the selection of dyestuffs; use only those that go on slowly.

There are so many dyestuffs in each class that it would take too much room and time to classify them here, but each manufacturer will gladly give whatever information is needed on any of his colors. In reducing, care should be taken that the temperature advised by the manufacturer is strictly adhered to. For instance, some colors, while dyed in a cold vat, require reduction at a very high temperature:

10 pounds Anthra Red B Paste
3 pounds Caustic Soda (powder)
4 pounds Hydrosulphite

The color should be reduced at 140 deg., but the dyeing is carried out cold.

With some of the hot dyeing group, the reduction temperature is much higher than the dyeing heat.

Recent developments have been made in the past year by Duran and Hugenin, of France, on a water-soluble Indigo and brought out under the name of "Indigosol O"; this is a stable sulphonic acid ester salt, and is soluble in water.

Scottish Dyes, Ltd., have made similar progress with the Anthraquinone group, and have made their Soledon Jade Green, which is a stable soluble salt of their Caledon Jade Green. This dyestuff, being soluble, needs no reduction and is dyed similar to any direct color with an addition of Glauber salt; the dyed yarn is then treated with a cold 1 per cent ferric chloride solution acidified.

With stable soluble salts of both the anthraquinone and indigoid series established, it is quite logical to expect rapid progress with this series of dyestuffs, and if the cost of manufacturing them can be lowered it is quite probable that within a very few years all necessity of reducing vat colors will be eliminated, for the new method will be more simple and positive.

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Multi-Color Effects on Hosiery

By Joseph H. Zens,

General Manager, United Hosiery Mills Corporation

In my talk I will not attempt to show that the process of dyeing multi-colors in hosiery is a simple one, nor will I attempt to give you any new or scientific information. Let me say, however, that the dye problem as I see it is not as complicated as it sometimes appears to be. Most of our apparent difficulties can be overcome if we carefully analyze the kind of yarns used in the knitting of the fabrics, the dye materials and the dye equipment.

Let us analyze the kind of materials used in the construction of knitted hosiery. We find that we have two fibers, namely, vegetable and animal, each of which have a different affinity for dyes, and these fibers used in combination make it possible to cross-dye the stocking, and thereby obtain a multi-color effect in one or more dye baths. The vegetable fibers used in hosiery are made into cotton yarns, gray or unmercerized and mercerized. The mercerized, having been chemically treated, naturally has more affinity for dyes than the unmercerized, and a two-color effect can be produced on a fabric knit out of these two yarns; however, there will be only a slight difference of shade, the unmercerized taking the lighter shade.

We have another material made of vegetable fibers, known as artificial silk or rayon yarn. This yarn, as you know, is made by chemically treating the vegetable fibers and thereby reducing them to a pulp or liquid form, which in turn is, by manipulation, produced into a yarn or thread of varied filaments. The artificial silk as produced by the different processes have a different affinity for dyestuffs; this is due to the chemical treatment to which the fibers have been subjected. There are several kinds of artificial silk, but those most commonly known and used are made by the Cuprammonium process, the Acetate process—which is known as Celanese—and the nitro-cellulose process, with a product known as Viscose. While the process of reducing the raw material is the same, or practically so, we do find that they do not work the same while dyeing. This is due to the different methods used in the neutralizing or finishing process. You can readily see that by running in combination, one with another, several kinds of artificial silk, a two or more color effect can be produced. It is important, however, that we carefully consider the kind of artificial silk we use in the construction of the fabric. By using Celanese an entirely different effect can be produced as the regular dyeing method has but very little, if any, effect on it, and it requires a special dye formula and a treatment different from that used on other artificial silks. The formula for the dyeing of this material is furnished by the makers of Celanese silks, and by several dyestuff manufacturers.

The animal fibers used in hosiery are made into wool or worsted yarns, and also pure silk yarns. The wool fiber is made into pure wool and worsted or part wool and cotton mixed; this yarn is commonly known as merino yarn, but this name or term has been discontinued by a ruling made by the Federal Trade Commission. By the use of the wool and cotton mixed yarn we can produce a two-color effect by dyeing the wool a desired shade with acid dyes without affecting the cotton, leaving it in its natural state. By the addition of an artificial silk a three-color effect can be produced.

Another method can be used to produce multi-color effects: by the use of a dyed yarn or by using an undyed resisted yarn in combination with other materials or fibers. The resisting process, however, is not generally used, because if it is not perfectly applied it will not work out satisfactorilly while dyeing. A two or three color effect can also be had in one garment by using a fast dye yarn of a darker shade run in combination with a natural or undyed yarn, which is dyed a lighter shade, thereby producing a two-color effect, and a third can be had by adding a silk or artificial sillk yarn. The dyed yarn used must be absolutely fast, and it is important that all surplus dye be removed before the yarn is used so as to avoid bleeding while the fabric is being dyed the lighter shade. Let me impress on you the importance of the proper selection of the kind of yarns to be used in the construction of the fabric, as the proper selection of them and the method of knitting will very materially assist the dyer in producing multi-color effects. The dyer should be taken into consultation in the matter of the kind of materials to be used, and the color effects to be produced before the materials are selected and put into fabric, because it will simplify the dyeing problem.

As I see it, the extensive use of pure silk, artificial silk and cotton run in combination with each other, is not so much a question of producing multi-colors on hosiery, but rather a question as to how we can dye a three-fiber fabric and produce shades that are level and perfect; by that I mean the same shade on the cotton, artificial silk and the pure silk. With the extensive and continued demand for the light shades which have been in vogue for the past years, and which is increasing rather than decreasing, I want to briefly discuss this phase of the color or dye problem. While dyeing a three-fiber fabric, as a rule, the pure silk and the mercerized cotton take the darker shade, while the artificial silk goes to the lighter shade, thereby producing a speckled effect. We, therefore, find it necessary to use salt and alkalies with continued boiling, and later running the batch in a cooling bath, until the desired results or shades are produced. Let me here caution against the use of strong alkalies, such as soda ash, etc., as they have a tendency to destroy the luster and tensile strength of artificial silk.

I have stressed the importance of a thorough knowledge of the kind of dye materials necessary to produce the best results. In order to produce a solid or one-color effect, or a multi-color effect on a fabric made from two or three kinds of fibers, care must be taken in the selection of the dyestuffs, as we know from experience that certain dyes and colors work very satisfactorily on one kind of material and not so well on others.

Here let me suggest that wherever possible avoid the use of prepared dyes mixed to a given formula; that you yourself make up your own formulas by carefully weighing out the constituent colors necessary to make a given shade during the dyeing process. Experience has proven that the prepared or mixed dye material does not always work out satisfactorily; and there are several reasons for this, such as the water used, chemicals, the utensils in which the dyeing is made, and, above all, the settling to the bottom of the heavier materials while the dyestuff is in transit and is carried in stock. Any and all of the foregoing will give you uneven shades.

The interest shown in the fancy lines of hosiery during the past two or three seasons is surprising, and I believe that the demand for this class of merchandise will continue just as long as the producers can and will create new ideas and designs. While the dyeing of multi-colors on fabric made out of the materials as I have described seems to be a rather difficult task, you can—by a careful study of the materials used—very materially assist in the development of the fancy lines now so much in demand.

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The lapel button badge illustrated herewith is worn by members of the American Association of Textile Chemists and Colorists.

The three "rings" are enameled in red, yellow and blue, respectively, and the initials and border are brought out in gold. The general effect is exceedingly attractive.

Badges may be secured at $1.50 each by addressing the Secretary.

WALTER E. HADLEY,
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AMERICAN
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THE FAST FABRIC DISCUSSION

IF the public demand for fast colored fabrics were not becoming so urgent there would have been little interest in the very active discussion on the fast color problem at the recent meeting of the Wholesalers' Association of Dress Fabric Buyers.

As the problem of guaranteeing fastness is basically a technical one its discussion by textile merchandising men is of some significance to dyers and to dye manufacturers as well. Fabrics are not rendered fast by attractive guarantees nor by mere discussion of the term "fast color." Fastness of any kind is the direct result of extreme care in the chemical processing of the fabrics, involving the materials and methods used.

The fabric buyers' discussion only brought out more prominently the long established fact that progress toward a solution of this problem is impossible without more definite knowledge regarding the meaning of the term "fast color." The amazing statements of some of the participants in the discussion revealed a deplorable mental confusion over the term itself and all that it implies. One man declared that it was a waste of time to discuss the fast color question, explaining that his firm used only vat dyes and consequently received few complaints. He stated that there were just three kinds of dyes. This attitude is inexcusable. The use of vat dyes does not, by itself, remove the difficulty of satisfying public demand for fastness. Surely, if it were as simple as that there would be no problem. The question that these wholesalers are facing involves the wording of a proper guarantee based on a clear-cut definition of fastness in each of its modified meanings, in order that a definite understanding can be struck between the public and the distributors and manufacturers. Clearly, an educational campaign among the latter groups is urgently necessary before such an understanding can be reached.

Several members of the association expressed the willingness to abide by the definition of the Federal Trade Commission, which is at present investigating the use of the term "fast" in advertising. One declared that there was a need for some authority to quote on the fast color proposition when answering complaints of customers, and that their "one hope" of such an authority is the Federal Trade Commission!

It all resolves itself into whether the fabric makers desire to produce goods possessing fastness qualities to which they can point with pride or merely goods that conform to some circumscribed definition of fastness. The Trade Commission is interested only in preventing misrepresentation in advertising fast goods. The public is interested in obtaining goods that actually are fast and will pay little attention to any Trade Commission's definition. If manufacturers are out to satisfy public demand their concern should be centered on how to make their goods faster. They would then have little trouble in framing an adequate guarantee. In short, those who do the guaranteeing should be more thoroughly informed on the technical phases of fastness. If all would approach the subject in the frank attitude of the man who admitted that he was "somewhat befuddled on the fast color subject," perhaps there would be more earnest endeavor to learn what constitutes fastness.

During the discussion mention of the dye manufacturer was conspicuously absent. This may indicate that textile men have grown out of the notion that the man who makes the dyes is wholly responsible for their fastness. Yet it does seem as though one responsibility does rest with the dye manufacturer—that of educating the textile man on the how and why of fastness. While some of the larger mills have been engaged in extensive research into the study of fastness, some of our most valuable contributions to this work have come from laboratories of the dye manufacturers. It would help to clarify the subject for those fabric men who have been discussing fastness if this knowledge were served up to them in non-technical language.

THE REGULATION OF WAR CHEMICALS

SOME agitation arose recently in the chemical industry, particularly among dyestuff manufacturers, over the Geneva anti-poison gas protocol which it is expected will come up for ratification in the next session of Congress. It is feared in the industry that the participation of this country in any international agreements to suppress chemical warefare would deal a severe blow at our chemical manufacturers if such agreements sought to regulate the peace-time production of chemicals for commercial use.

It is unnecessary to emphasize here the keynote position of chemistry in industry. The important commercial uses of many poison gases and other war chemicals are also common knowledge. It is very plain that our chemical industry must produce continually a quantity of these so-called war chemicals sufficient to supply domestic industries. To avoid unprofitable overproduction, an outlet must be held open for these chemicals in the form of export trade with foreign countries. Any plan to restrict production or exportation is therefore to be con-

demned. In fact, it would be practically impossible to enforce any *international* regulation of this nature, for it would mean, literally, that the operation of every chemical plant in every important country would be subject to a single law.

Chemical manufacturers are human, though at times they are painted as cold-blooded advocates of poison-gas warfare. Their protests against such regulation of their industry are a perfectly natural reaction to the provisions of the protocol and should not be mistaken for that old bugaboo, war profiteering, nor even for plain commercial greed. They are impelled purely by motives of self defense.

It would seem that rather than seek to control production and distribution of war chemicals the logical move would be to restrict their *use* as such. This would present its own problems, at present apparently unsolvable, but it is at least a far more intelligent step and one with which chemical manufacturers should have no quarrel.

DROP IN GERMAN DYE TRADE SHOWN BY EXPORT FIGURES

That the German dyestuffs monopoly which before the war dominated the world has been definitely broken is shown by statistics submitted to the Department of Commerce by Consul A. W. Kliefoth, Berlin. A comparison of the official German figures shows that 2,144 metric tons of dyestuffs left Germany during the first three months of 1925, as compared to 31,594 metric tons for the first quarter of 1913. Thus the shipments in the 1925 period were only 6.7 per cent of those of the 1913 quarter.

Shipments for the first three months of 1922 amounted to 15,257 tons, in 1923 they dropped to 11,464 tons, while for the corresponding period of 1924 they declined to 9,832 metric tons. The fundamental causes for the large decline of German dyestuffs are to be found in the steady development of the dyestuff industry in the chief countries of the world, the changed market conditions, and the protective policies of many European nations, who during the war were enabled to extend their own markets in Spain, Portugal, and other countries.

Before the war, four-fifths of the German production, amounting to 80,000 metric tons, was absorbed by the world market. This contingent equalled 75 per cent of the world demand. Europe received more than 31,600 tons, valued at 73,191,000 marks, which equalled more than half of the German exports. According to official figures for 1913, exports to Great Britain amounted to 11,016 metric tons, and the exports to Austria-Hungary equalled 18 per cent, Italy 13 per cent, and Belgium 8 per cent of the German exports; and the Netherlands and France 8 per cent each.

These countries together received 82 per cent of German dyestuffs exports. Imports into Germany, on the other hand, amounted only to 2,552 metric tons, or 5,870,000 marks, of which 75 per cent were imported from Switzerland. According to the figures of the German Customs Tariff for 1914, the German European trade in dyestuffs amounted to a favorable balance of 67,000,000 marks.

Changed conditions after the war made impossible a German dyestuffs balance on the pre-war basis. The industry has partly lost its market in Western Europe, especially in Great Britain, France, and Belgium. This loss amounts to about 65 per cent but it is not felt to its full extent as conditions in the Southeastern and Eastern European markets have improved for German dyestuffs, especially in Russia, Poland, Rumania, Finland, Bulgaria and Greece, where German dyestuffs still holds a dominant position. Soviet Russia has also become an important customer during the last few years.

Conditions on the Czecho-Slovakian market have become difficult on account of reparation dyestuffs which are sold by France on this market.

The general development of the economic situation has induced German coal tar dye producers to follow a more intensive sales policy in the Eastern districts of Europe, and as a result the sales in this part of Europe are improving.

SOCIETIES TO MEET AT CHEMICAL EXPOSITION

The list of chemical and allied societies and associations which will meet in New York during the week of the Chemical Exposition, continues to grow. In addition to the big chemical industry banquet which will be held under the auspices of a dozen or more organizations, individual meetings of a technical or business nature are being planned for the week of September 28th to October 3rd, which is Chemical Exposition Week at the Grand Central Palace, New York. Meetings which have been definitely scheduled, or are expected to be held, include an intersectional gathering of the American Chemical Society, meetings of the American Ceramic Society, Society of Chemical Industry, Technical Association of the Pulp and Paper Industry, the Salesmen's Association of the American Chemical Industry, National Association of Finishers of Cotton Fabrics, and the American Institute of Chemical Engineers. Others are expected to be added to this group before the beginning of September.

What appears to be the largest gathering of all will in all probability be the meeting of the Eastern sections of the American Chemical Society. The fact that the annual meeting of the society was held on the coast this year cut down the attendance from the East to a normal extent, and it is expected that a meeting in New York during the Chemical Exposition will be largely attended.

The National Association of Finishers of Cotton Fabrics will meet during the week of the exposition and take up some of the following subjects: Bleaching cotton fiber, sizes in finishing, control of dye purchases, mercerization, artificial silk and its relation to the textile industry, chemicals in cotton finishing and others. Leading men in the chlorine field, starch and dextrine manufacture, and general chemical industry will address the gathering.

Foreign Dyes Imported Through New York and Other Ports During July

Compiled by the Chemical Division of the Bureau of Foreign and Domestic Commerce in Collaboration with the Chemical Division of the United States Tariff Commission

KEY TO ABBREVIATIONS OF MANUFACTURERS' NAMES

1—THE SIX LEADING GERMAN COMPANIES

A—Actien-Gesellschaft fur Anilin-Fabrikation, Berlin. Founded 1873.
B—Badische Anilin-und-Soda-Fabrik, Ludwigshafen-on-the-Rhine. Founded 1865.
By—Farbenfabriken, vormals Friedr. Bayer & Co., Leverkusen-on-the-Rhine. Founded 1862.
C—Leopold Cassella & Co., Frankfort-on-the-Main. Founded 1870.
K—Kalle & Co., A. G., Biebrich-on-the-Rhine. Founded 1870.
M—Farbwerke, vormals Meister Lucius & Bruning, Hochst-on-the Main. Founded 1862.

2—THE SMALLER GERMAN COMPANIES

BK—Leipziger Anilinfabrik Boyer & Kegel, Furstenberg, near Leipzig. Founded 1882.
CG—Chemikaliewerk Griesheim G. m. b. H., Griesheim-on-the-Main. Founded 1882.
CJ—Carl Jager G. m. b. H., Anilinfarbenfabrik, Dusseldorf. Founded 1823
GrE—Chemische Fabrik Griesheim-Electron, Offenbach-on-the-Main. Founded 1842.
L—Farbwerk Mulheim, vormals A. Leonhardt & Co., Mulheim-on-the-Main. Founded 1879
tM—Chemische Fabriken, vormals Weiler ter Meer, Uerdingen-on-the-Rhine. Founded 1877.
WD—Wulfing, Dahl & Co., A. G. Barmen. Founded 1842.

3—SWISS COMPANIES (ALL AT BASEL)

DH—Farbwerke vormals L. Durand, Huguenin & Co. Founded 1871.
G—Anilinfarben-und Extract-Fabriken, vormals Joh. Rud. Geigy. Founded 1764.
I—Gesellschaft fur chemische Industrie. Founded 1885.
S—Chemische Fabrik, vormals Sandoz & Co. Founded 1887

4—DUTCH AND FRENCH COMPANIES

FA—Farbwerk Ammersfoort, Ammersfoort, Netherlands. Founded 1888
NF—Niederlandische Farben-und-Chemikalienfabrik Delft, Delft, Netherlands. Founded 1897.
CN—Compagnie Nationale de Matieres Colorantes et Produits Chimiques. Founded 1917. (Etablissements Kuhlmann merged with this company in 1923.)
P—Societe Anonyme des Matieres Colorantes et Produits Chimiques St. Denis (formerly A. Poirrier). Founded 1830.

5—ENGLISH COMPANIES

Bro—Brotherton & Co., Ltd., City Chambers, Leeds.
BAC—British Alizarine Co., Ltd., Manchester
BD—British Dyestuffs Corporation, Ltd., London.
Cl Co.—The Clayton Aniline Co., Ltd., Clayton, Manchester.
CV—The Colne Vale Dye & Chemical Co., Ltd., Milnsbridge, Huddersfield.
Hol—L. B. Holliday & Co., Ltd., Huddersfield.
Scot—Scottish Dyes, Ltd., Grangemouth.

THE imports of coal-tar dyes through the port of New York for the month of July totaled 363,375 pounds, with an invoice value of $342,840. Imports of dyes through other ports included: Albany,* 279,409 pounds, valued at $320,231; Philadelphia, 28,700 pounds, valued at $25,646; Boston, 4,159 pounds, valued at $3,558, and Milwaukee, 200 pounds, valued at $340.

Imports of Synthetic Dyes

1925—	Pounds	Invoice Value
January	403,984	$359,376
February	373,259	365,268
March	527,964	488,501
April	451,005	426,141
May	370,271	347,904
June	376,668	333,654
July†	675,843	692,615
Total, seven months...	3,178,994	$3,013,459

1924—	Pounds	Invoice Value
January	283,643	$237,868
February	161,869	180,570
March	302,799	307,247
April	176,550	183,789
May	183,079	177,553
June	153,019	156,857
July†	143,680	139,558
Total, seven months...	1,359,639	$1,383,442

Five Leading Dyes, by Quantity, Imported During July

	Pounds
Alizarine Blue Black	21,819
Helindone Orange R (single strength)	16,400
Algol Brown R (single strength)	14,198
Ciba Violet B, R (single strength)	14,196
Fast Green Extra Bluish	13,974

*The total for the port of Albany includes imports for the months of March to July, inclusive.

†The total for the port of Albany includes imports for the months of March to July, inclusive.

Dyes and Intermediates Remaining in Bonded Customs Warehouse

	Coal-Tar Dyes and Colors (pounds)	Coal-Tar Intermediates (pounds)
August 31, 1924	507,338	1,081,287
September 30, 1924	559,661	1,111,656
October 31, 1924	552,556	1,050,037
November 30, 1924	553,760	1,031,460
December 31, 1924	575,051	1,086,108
January 31, 1925	571,371	952,202
February 28, 1925	566,038	961,406
March 31, 1925	653,020	1,050,539
April 30, 1925	668,365	1,048,324
May 31, 1925	734,705	1,087,745
June 30, 1925	825,528	1,171,383

Per Cent by Country of Shipment

	1925				
	July‡	June	May	April	Mar.
Germany	57	50	50	46	49
Switzerland	32	32	32	34	39
Italy	2	5	4	6	5
England	3	4	6	6	2
France	1	3	2	2	1
Belgium	1	3	2	3	2
Canada	3	2	3	2	2
Ho'land	1	1	1	1	..

‡Percentages in above table do not include Albany. Including Albany they are as follows: Germany, 75; Switzerland, 19; England, 2; Italy, 1; Belgium, 1; Canada, 1; France, 1.

Imports of Color Lakes

	Pounds	Invoice Value
January	385	$728
February	2,112	1,926
March	5,422	2,061
April	15,660	6,167
May	1,600	1,079
June	3,014	1,511
July	611	474

The dyes in this report are grouped by both Colour Index and Schultz numbers, and in the case of those which could not be identified by either number the classification according to the ordinary method of application was adopted. As the pastes and powders of the vat dyes vary widely in strength and quantity, each vat dye has been reduced—in nearly every case—to a single-strength basis.

DYES OF COAL-TAR ORIGIN

(This table includes imports through the port of New York to the amount of 363,375 pounds, and also 279,409 pounds through Albany, 28,700 pounds through Philadelphia, 4,159 pounds through Boston and 200 pounds through Milwaukee.)

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
2	2	Fast Printing Green—(By)	353
69	73	Helio Fast Red RL Ex. Pst.—(By)	5
69	73	Helio Fast Red RL Pdr.—(By)	300
80	83	Ponceau 3R—(Gr-E)	5
105	88	Acid Anthracene Brown R—(By)	1,042
127	118	Brilliant Geranine B—(By)	
		Geranine G—(By)	900
145	140	Jasmine High Conc.—(G)	507
150	144	Orange S—(B)	220
219	144	Eriochrome Flavine A Conc.—(G)	1,102
259	233	Cloth Red B—(By)	50
278	—	Benzo Fast Red 2BL—(By)	
		Fast Cotton Red 8BL—(Gr-E)	1,783
280	247	Imperial Scarlet 3B—(By)	400
289	257	Sulphon Cyanine G—(By)	1,700
307	265	Acid Milling Black B—(G)	2,205
316	273	Developing Blue 2R—(Gr-E)	500
319	—	Benzo Fast Heliotrope BL—(By)	
		Benzo Fast Heliotrope 2RL—(By)	
		Diamine Fast Violet FFBN—(C)	1,588
324	—	Diazo Brill. Orange GR Ex.—(By)	400
325	—	Diamine Brill. Violet B—(C)	
		Brilliant Benzo Violet B—(By)	1,300
326	279	Benzo Fast Orange S—(By)	
		Benzo Fast Orange WS—(By)	
		Benzo Fast Scarlet 5BS—(By)	1,200
327	—	Benzo Fast Scarlet 4BS—(By)	6,839
382	319	Chloramine Red 3B—(S)	1,000
409	339	Diamine Orange B—(C)	300
430	—	Polar Red G Conc.—(G)	2,204
436	358	Chloramine Red 8BS—(By)	
		Toluylene Red Pdr.—(Gr-E)	
		Triazol Red 8BL—(Gr-E)	3,087
440	360	Ignamine Orange R—(B)	780
441	—	Chromocitronine R—(Q)	269
449	364	Diazo Brill. Black B—(By)	2,075
451	366	Deltapurpurine 5B—(By)	842
456	370	Brilliant Congo R—(Gr-E)	50
471	385	Minaxo Blue 4RX—(B)	500
487	400	Acid Anthracene Red 3B—(By)	
		Acid Anthracene Red 3BL—(By)	
		Acid Milling Red R—(G)	1,793
511	418	Diamine Brilliant Blue G—(C)	200
539	436	Columbia Black FB—(Gr-E)	5
582	463	Cotton Black RW Ex.—(B)	100
596	476	Benzo Chrome Brown G—(By)	200
621	11	Chloramine Orange G—(By)	
		Chlorazol Fast Orange D—(BD)	
		Stilbene Yellow 3BX—(B)	1,341
631	14	Diphenyl Chrysoine GC—(G)	1,102
636	19	Fast Light Yellow 2G—(By)	
		Fast Light Yellow 3G—(By)	8,686
639	22	Supra Light Yellow 2GL—(By)	450
649	26	Triazogene Orange R—(Gr-E)	100
653	—	Pyrazol Orange G Conc.—(S)	9,026
654	—	Diazo Fast Yellow 2G—(By)	1,996

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
658	496	Rhoduline Blue 6G—(By).....	100
662	499	Brilliant Green Crystals—(A)....	28
667	503	Brilliant Acid Green 6B—(By)	
		Guinea Fast Green 3B—(A)	
		Poseidon Green SGX—(B).....	2,171
670	505	Light Green SF Yellowish—(B)..	330
671	506	Erioglaucine X High Conc.—(G).	3,163
681	516	Crystal Violet Extra—(B).....	958
691	523	Fast Green Extra Bluish—(By)..	13,974
697	529	Acid Violet 6B—(A).....	100
699	531	Eriocyanine AC—(G)	988
710	541	Brilliant Sky Blue 5G—(By).....	500
712	543	Brilliant Acid Blue V—(By).....	1,757
714	545	Brilliant Acid Blue A—(By)	
		Poseidon Blue BR Extra—(B)...	4,130
715	546	Blue Extra—(C)	
		Cyanol FF—(C)	400
717	548	Acid Violet 6BNOO—(B).....	110
729	559	Victoria Blue B—(I)	
		Victoria Pure Blue B—(A)	
		Victoria Pure Blue BO—(B).....	2,972
731	560	Night Blue—(B)	200
733	562	Intensive Blue B—(By).....	100
735	564	Alkali Fast Green 3G—(By).....	100
736	565	Wool Blue G Extra—(Gr-E).....	200
748	579	Sulpho Rosazeine B Extra—(M).	100
749	573	Rhodamine B Extra (s. s.)—(A)	
		Rhodamine B Extra (s. s.)—(B)	
		Rhodamine B Extra (s. s.)—(By)	
		Rhoda. B Ex. Conc. (s. s.)—(G)	
		Rosazeine B Extra (s. s.)—(M)...	11,825
752	571	Rhodamine 6G Extra (s. s.)—(I)	
		Rosazeine 6GD Extra (s. s.)—(M)	11,060
757	580	Fast Acid Violet B—(M).....	200
758	582	Erio Fast Fuchsine BBL—(G)...	1,102
788	603	Acridine Orange DHE—(DH)	
		Brill. Acridine Orange A—(DH)	
		Euchrysine 3RK—(B)	
		Rhoduline Orange NO—(By)....	2,104
789	—	Patent Phosphine G, M—(I).....	992
793	606	Phosphine 3R—(A)	2,000
794	—	Flavophosphine 4G Conc.—(M)..	5
797	608	Patent Phosphine GRNTN—(B)	
		Patent Phosphine RRDX—(B)...	2,300
802	—	Quinoline Yellow KT Ex. Conc.	
		—(By)	300
813	198	Mimosa Z—(G)	1,102
814	617	Chloramine Yellow FF—(S).....	100
828	672	Azo Carmine GX—(B).....	1,290
829	673	Rosinduline 2B Bluish—(K).....	500
833	—	Wool Fast Blue BL—(By)	
		Wool Fast Blue GL—(By)	
		Wool Fast Violet B—(By)	
		Xylene Milling Blue AE Conc.—	
		(S)	5,834
849	689	Indazine (spirit soluble)—(C)....	10
851	690	Diphene Blue R—(A).....	831
871	922	—Diphenyl Black Base I—(M)....	1,000
875	923	Fur Blue Black A, B—(A)	
		Fur Yellow 4G—(Gr-E).....	1,510
		Nako 3GN—(M)	1,510
892	635	Gallo Violet DF Pdr.—(By).....	200
894	637	Gallamine Blue Ex. Pst.—(G)....	2,524
905	645	Gallazine Powder—(DH)	441
926	661	Rhoduline Blue GO—(By)	
		Thionine Blue GO—(M).....	600
927	663	New Methylene Blue N—(M)	
		New Methylene Blue N—(C)....	2,300
969	748	Hydron Blue R Paste—(By)	
		Hydron Blue R Pdr. (s. s.)—(C)..	43
971	748	Hydron Blue G Paste—(By).....	10
1006	746	Pyrogene Green 3G—(I).....	1,102
1027	778	Alizarine Red IB Ex. Pst.—(By)..	862
1033	779	Alizarine Orange AO Pst.—(BA)	
		Alizarine Orange R Pst.—(M)	
		Alizarine Orange RP Pst.—By)..	8,462
1034	780	Alizarine Red S Pdr.—(B)	
		Alizarine Red W Pdr.—(By).....	827
1037	783	Purpurine—(By)	9,863
1039	785	Alizarine Red XGP Pst.—(By)...	2,603
1040	784	Alizarine Red SX Pst.—(B)	
		Alizarine Red SX Pst.—(By)....	2,380
1045	787	Alizarine Bordeaux BP Pst.—(By)	
		Alizarine Bordeaux GP Pst.—(By)	
		Alizarine Bordeaux GG Pst.—(By)	2,093
1050	788	Alizarine Cyanine RR Pdr.—(By)	463
1051	799	Alizarine Cyanine GG Pdr.—(By)	1,007
1053	858	Alizarine Saphirol SE Pdr.—(By)	
		Aliz. Saphirol WSA Pdr.—(By)	
		Alizarine Blue WS Pdr.—(By)...	5,247
1054	858	Alizarine Light Blue B—(S)	
		Alizarine Sapphire Blue B—(I)	
		Alizarine Saphirol B—(By).....	3,126
1058	—	Alizarine Uranol BB, R—(By)...	600
1062	789	Aliz. Cyanine WRR Pdr.—(By)..	225
1065	—	Alizarine Cyanine Black G Pst.—	
		(By)	5
1067	804	Alizarine Blue S Pdr.—(By).....	2,207
1073	852	Alizarine Direct Violet R—(M)	
		Alizarine Irisol R Pdr.—(By)....	988
1075	856	Alizarine Astrol B Pdr.—(By)	
		Alizarine Blue AS—(Q).....	5,417
1077	860	Aliz. Direct Fast Blue BGAOO—	
		(B)	996
1078	865	Alizarine Cyanine Green G Ex.	
		Pdr.—(By)	
		Alizarine Cyanine Green 3G Ex.	
		Pdr.—(By)	6,460
1080	853	Anthraquinone Violet Pdr.—(B).	500
1081	864	Anthra. Green GXNO—(B).....	89

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
1084	854	Alizarine Viridine FF Pst.—(By)	3,596
1085	862	Aliz. Blue Black B Pdr.—(By)	
		Aliz. Blue Black B Pdr.—(M)	
1087	851	Aliz. Blue Black 3B Pdr.—(By)	21,819
		Alizarine Direct Blue B—(M)	
1088	855	Alizarine Leveling Blue B—(C)	2,750
		Alizarine Blue SKY—(By)	
1091	—	Alizarine Sky Blue B—(By)	11,037
		Alizarine Rubinol 3G, 5G, R—(By)	
		Alizarine Ruby R—(By)	
1092	—	Anthra Rubine B—(K)	2,955
1095	759	Alizarine Geranol B Pdr.—(By)	1,502
		Anthra Yellow GC Pst.—(B)	
		Anthra Yellow GC Pst. Fine—(B)	
		Anthra Yel. GC Pdr. (s. s.)—(B)	
		Anthraflavone GC Pdr. (s. s.)—(B)	
1097	761	Vat Yellow GC Pst.—(B)	5,415
1099	763	Vat Orange RRT Pst.—(B)	4,800
1102	765	Vat Dark Blue BOA Pst. Fine—(B)	2,446
		Anthra Green B Dbl. Pst. (s. s.)—(B)	
		Anthra Green B Dbl. Pst. Fine (s. s.)—(B)	
		Anthra Green B Pdr. (s. s.)—(B)	
		Vat Black BB Dbl. Pst. (s. s.)—(B)	
1104	767	Vat Brilliant Violet RR Pst. Fine—(B)	506
		Vat Violet RR Ex. Dbl. Pst. (s. s.)—(B)	
		Vat Violet RR Ex. Pdr. (s. s.)—(B)	
1206	838	Vat Blue RSP Triple Pdr. (s. s.)—(B)	5,207
1108	839	Vat Blue RK Pst.—(By)	900
		Vat Blue RK Pdr. (s. s.)—(By)	
1109	840	Vat Blue 3G Pst.—(B)	2,398
		Vat Blue 3G Pst. Fine—(B)	
		Vat Blue 3G Dbl. Pst. (s. s.)—(B)	
		Vat Blue 3G Dbl. Pst. Fine (s. s.)—(B)	
1110	841	Vat Blue GGSP Pst.—(B)	263
		Vat Blue GGSP Dbl. Pst. (s. s.)—(B)	
		Vat Blue GGSNP Pst—(B)	
		Vat Blue GGSNP Dbl. Pst. (s. s.)—(B)	
		Vat Blue GGSZ Pst.—(B)	
		Vat Blue GGSZ Dbl. Pst. (s. s.)—(B)	
1111	844	Vat Blue 5G Pst.—(By)	569
		Vat Blue 5G Pdr. (s. s.)—(By)	3,904
1113	842	Algol Blue FB Pst.—(By)	
		Vat Blue GCD Pst.—(B)	
		Vat Blue GCD Pst. Fine—(B)	
		Vat Blue GCD Dbl. Pst. (s. s.)—(B)	
		Vat Blue GCD Dbl. Pst. Fine (s. s.)—(B)	
		Helindone Blue IGCD Pdr. (s. s.)—(M)	
1115	843	Cibanone Blue G Pdr.—(I)	6,155
1115	843	Vat Blue GC Pst.—(B)	771
		Vat Blue GC Pst. Fine—(B)	
		Vat Blue GC Dbl. Pst. (s. s.)—(B)	
		Vat Blue GC Dbl. Pst. Fine (s. s.)—(B)	
1116	847	Vat Green BB Pst.—(By)	262
		Vat Green BB Pdr. (s. s.)—(By)	
1118	849	Vat Yellow G Dbl. Pst. (s. s.)—(B)	4,397
		Vat Yellow G Dbl. Pst. Fine (s. s.)—(B)	
		Vat Yellow G Pdr. (s. s.)—(B)	
1120	867	Anthra Brown B Paste—(B)	7,336
		Anthra Brown B Pdr. (s. s.)—(B)	
1123	848	Anthra Gray B Dbl. Pst. (s. s.)—(B)	2,380
		Anthra Gray B Dbl. Pst. Fine (s. s.)—(B)	
		Anthra Gray B Pdr. (s. s.)—(B)	
1126	814	Leucol Yellow G Pst.—(By)	200
1131	816	Vat Red 5GK Pdr. (s. s.)—(By)	5
1132	817	Vat Yellow GK Pst.—(By)	1,600
		Vat Yellow GK Pdr. (s. s.)—(By)	
1133	819	Algol Brill. Red 2B Pst.—(By)	2,646
		Algol Brill. Red 2B Pdr. (s. s.)—(By)	
		Algol Red FF Ex. Pst.—(By)	
		Algol Red FF Ex. Pdr. (s. s.)—(By)	
		Algol Red R Ex. Pst.—(By)	
		Algol Red R Ex. Pdr. (s. s.)—(By)	
1134	821	Algol Blue 3R Pst.—(By)	9,189
		Algol Blue 3R Pdr. (s. s.)—(By)	
		Grelanone Violet 3B Pdr. (s. s.)—(Gr-E)	
		Vat Brill. Violet BBK Pst.—(By)	
		Vat Brill. Violet BBK Pdr. (s. s.)—(By)	
1135	820	Grelanone Violet BR Pdr. (s. s.)—(Gr-E)	5,474
		Vat Brill. Violet RK Pdr. (s. s.)—(By)	
1137	824	Grelanone Orange R Pst.—(Gr-E)	2,184
1142	830	Anthra Red RT Pst. Fine—(B)	112
		Anthra Red RT Dbl. Pst. (s. s.)—(B)	
		Anthra Red RT Dbl. Pst. Fine (s. s.)—(B)	219

Colour Index No.	Schultz No.	Name of Dye and Mfr.	Quantity (pounds)
1143	827	Anthra Bordeaux R Pst.—(B) Anthra Bordeaux R Pst. Fine—(B) Anthra Bordeaux R Pdr. (s. s.)—(B)	113
1145	834	Vat Gray GK Pst.—(By)	1,594
1146	828	Anthra Bordeaux B Pst.—(B) Anthra Bor. B Pst. Fine—(B) Anthra Bor. B Pdr. (s. s.)—(B)	487
1150	833	Vat Olive R Pst.—(By) Vat Olive R Pdr.—(By)	11,585
1151	—	Grelanone Bwn. RR Pst.—(Gr-E) Helindone Brown IR Pst.—(M) Helindone Brown IR Pdr. (s. s.)—(M) Vat Brown R Pst.—(By) Vat Brown R Pdr. (s. s.)—(By)	14,198
1152	—	Helindone Brown IG Pdr. (s. s.)—(M) Vat Brown G Pst.—(By) Vat Brown G Pdr. (s. s.)—(By)	11,394
1155	825	Algol Red B Pst.—(By)	1,995
1161	871	Vat Red Violet RRK Pst. Fine—(B)	758
1162	831	Helindone Red IRK Pst. Fine—(M) Vat Red RK Pst.—(B)	2,356
1163	832	Vat Violet BN Pdr. (s. s.)—(B) Vat Violet BN Ex. Pdr. (s. s.)—(B)	660
1167	791	Anthra Olive G Pdr. (s. s.)—(B)	31
1169	792	Cibanone Orange R Pdr. (s. s.)—(I)	4,408
1170	795	Cibanone Yellow R Pdr. (s. s.)—(I)	9,696
1171	868	Cibanone Brown B Pdr.—(I)	500
1173	793	Cibanone Blue 3G Pst.—(I)	661
1178	876	Indigo Vat—(B) Indigosol O—(By) Indigosol O—(B) Indigosol O—(DH)	4,394
1184	881	Brom Indigo FBP Pst.—(By)	10
1186	883	Indigo MLB/6B Pdr. (s. s.)—(M)	2,000
1189	887	Brill. Indigo 4G Pdr. (s. s.)—(B)	6,000
1200	895	Alizarine Indigo 3R Pst.—(By)	798
1202	893	Alizarine Indigo G Pst.—(By)	693
1211	910	Anthra Pink AN Pst.—(B) Thioindigo Rose BN Ex. Pst.—(K)	549
1212	918	Ciba Red 3B Pst.—(I) Helindone Reddish Violet IRH Pst.—(M) Thioindigo Red 3B Pst.—(K) Vat Red Violet RH Pst.—(B)	5,090
1217	913	Helindone Orange R Pdr. (s. s.)—(M) Hydron Orange RF Pst.—(C)	16,400
1222	901	Anthra Violet B Pst.—(B) Ciba Violet B Pst.—(I) Ciba Violet R Pst.—(I)	14,196
1228	907	Ciba Scarlet G Ex. Pst.—(I)	8,829
1228	907	Anthra Scarlet GG Pst.—(B)	44
1229	908	Ciba Red R Pst.—(I)	8,816

UNIDENTIFIED DYES

Acid Dyes

Name of Dye and Manufacturer	Quantity (pounds)
Acid Blue RBF—(I)	551
Acid Rhodamine BG—(B)	500
Acid Rhodamine 3R—(I)	551
Alizarine Leveling Blue CA—(C)	100
Alizarine Supra Blue A—(By)	500
Alkali Fast Green 2BF—(By)	
Alkali Fast Green 10G—(By)	600
Alkaline Blue H—(A)	5,152
Astra Phloxine FF Extra—(By)	300
Azo Orseille BB—(C)	200
Brilliant Acid Blue EG—(By)	
Brilliant Acid Blue FF—(By)	1,000
Brilliant Croceine 3BA—(By)	331
Brilliant Milling Blue B—(C)	3,400
Brilliant Wool Blue FFR Extra—(By)	1,664
Fast Acid Green BB Extra—(M)	500
Fast Acid Magenta G—(M)	25
Fast Light Red B—(By)	200
Guinea Blue A—(A)	500
Guinea Fast Red BL—(A)	163
Indigo Carmine Blue FF—(Gr-E)	100
Indocyanine B—(A)	1,000
Ink Blue BJTN Powder—(Gr-E)	200
Kiton Fast Red R—(I)	220
Milling Orange G—(A)	400
Milling Red GA—(Gr-E)	100
Neolan Blue G—(I)	220
Neolan Blue 2G—(I)	1,100
Neolan Pink G—(I)	220
Neolan Red BR—(I)	441
Neolan Violet R—(I)	220
Neolan Yellow G—(I)	331
Neutral Violet O—(M)	25
Onis (Anthosine) B—(B)	300
Orthocyanine B—(A)	500
Pilatus Black SF—(B)	300
Poseidon Green VGGX—(B)	300
Radio Brown B—(C)	300
Radio Red G—(C)	300
Radio Yellow R—(C)	500
Silk Blue BSIC Powder—(A)	200
Soluble Blue T—(B)	100
Soluble Carmine—(B)	500

(*Continued on page 576*)

Dyestuff Tables

A List of the Principal American-Made Colors with Their Properties and Fastness Characteristics

[NOTE: The publishers of The REPORTER have secured more or less complete data in regard to many of the dyestuffs which are at the present time being manufactured in the United States. As the following material has been brought together from various sources, they realize that errors are quite likely to appear, and it is earnestly requested that any readers who find errors or who are able to give additional information will communicate with the publishers in order that this material may be made as correct, complete and up to date as possible. These tables will appear serially until all colors upon which we have data shall have been covered. The publication of this data was begun in the issue of March 10, 1924.]

PRIMULINE

(Schultz No. 616)

COMPOSITION: Quinoline.

SPECIALLY SUITABLE FOR: Cotton.

USUAL METHOD OF DYEING: With salt for red.

SHADE: Dyed direct, a lemon yellow. Dyed and developed with beta-naphthol, a scarlet.

LEVEL: Dyes level.

FASTNESS TO (Dyed Direct):

Acid: Fast to acetic; redder with mineral acids.
Alkali: Fast.
Light: Fugitive.
Washing: Fast.
Boiling Alkali (5 per cent soda ash): The developed shade with beta-naphthol bleeds a little into white. The solution is scarcely tinted.

DYED BY OTHER METHODS: Dyed with chloride of lime (¼ deg. Be.) and diazotized: An orange yellow fast to washing and light. Dyed and developed with 2 per cent soda ash at 100 deg. Fahr.: A rather dull yellow. Dyed and developed with Orange Developer R: A bright orange yellower and brighter than Brill. Orange G (S-339) with beta-naphthol; same fastness to washing and cross-dyeing and light; the Diazo Brill. Scarlets are faster to light, but do not dye as level. With meta-phenylene diamine: A claret shade; only 3 ounces needed for 5 pounds of color. With beta-naphthol: A scarlet; fast to acids and washing; topped with copper, faster to light; fast to cross-dyeing; fairly fast to sizing. With soap: Not suitable; thin and uneven. With phenol: Not fast to alkali; goes redder; stands cross-dyeing and is fast to washing and sizing. With resorcin: Fast to sizing; fairly fast to cross-dyeing. With ethyl beta-napthylamine: A claret shade fairly fast to washing, sizing and cross-dyeing, but fugitive to light. With alpha naphthol: A scarlet; fairly fast to cross-dyeing and sizing. Tests for Primuline on the fiber (developed with beta-naphthol): (1) Tin crystals and hydrochloric acid turn it orange; (2) hydrosulphite and caustic turn it yellow; the original shade can be restored by diazotizing and developing.

ON UNIONS: Dyes about equal.

ON OTHER MATERIALS: Silk: Dyed with acetic acid and diazotized and developed with soap (10 per cent one-half hour at 105 deg. Fahr.), gives a fine golden yellow which will stand cross-dyeing. On silk dyed and developed with beta-naphthol the shade stands cross-dyeing, washing and fulling.

DISCHARGING: Dyed direct: Permanganate method not suitable. Tin and zinc suitable for color discharge.

COMPETING PRODUCTS: Made in the United States by Essex Aniline Works (Selling Agents, Grasselli Dyestuff Corporation), under name of Primuline; Newport Chemical Works, under name of Primuline Extra; Garfield Aniline Works (Selling Agents, U. S. Color & Chemical Company), under name of Primuline; National Aniline & Chemical Company, under name of Primuline NAC; Peerless Color Works, under name of Primuline Superior.

CHLORAMINE YELLOW

(Schultz No. 617)

COMPOSITION: Thiobenzyl.

SPECIALLY SUITABLE FOR: Cotton, cotton-wool unions and cotton-silk unions.

USUAL METHOD OF DYEING: Glauber salt and soda.

SHADE: Dull yellow; somewhat thin.

SHADE BY GASLIGHT: Duller.

SOLUBILITY: Good.

LEVEL: Dyes level.

EXHAUSTS: Well.

FASTNESS TO:

Acid: Fast to acetic; redder with sulphuric.
Alkali: Fast.
Boiling: Will not stand boiling.
Chlorine: Very good.
Cross-Dyeing: Will not stand cross-dyeing.
Ironing: Fast.
Light: Equals Direct Yellow R (S-9).
Perspiration: Fast.
Rubbing: Fast.
Washing: Fast in light percentage; in heavy percentage, adjacent white is stained.

OTHER PROPERTIES: Suitable for pad dyeing.

ON UNIONS: Cotton-wool unions: Very well adapted; both fibers dyed the same shade; best dye in neutral salt bath. Cotton-silk unions: Very well adapted; in a Glauber salt and soap bath the silk is only slightly colored.

ON OTHER MATERIALS: Silk: Dyes on silk in curdled soap bath; fast to water. Wool: Dyes well on wool in a neutral bath; the bath can be cleared with acetic acid; on wool the color is very fast to fulling.

DISCHARGING: Gives reddish-brown discharge with tin. With zinc dust, a moderate white.

COMPETING PRODUCTS: Made in the United States by Garfield Aniline Works (Selling Agents, U. S. Color & Chemical Company), under name of Chloramine Yellow M; Peerless Color Works (Selling Agents, Dunker & Perkins

Company), under names of Direct Fast Yellow B, FF and NN; Calco Chemical Company, under name of Direct Fast Yellow BX; Newport Chemical Works, Inc., under name of Direct Fast Yellow NN.

DELPHIN BLUE
(Schultz No. 622)

COMPOSITION: Oxazine.

SPECIALLY SUITABLE FOR: Wool and cotton printing.

USUAL METHOD OF DYEING: Chrome mordant.

SHADE: Greenest of the chrome blues.

SHADE BY GASLIGHT: Redder.

SOLUBILITY: Very good.

LEVEL: Dyes level.

EXHAUSTS: Well.

FASTNESS TO (on wool dyed chrome bottom):
Acid: Fast to organic acids; turns brown with mineral acids.
Alkali: Fast.
Fulling: Fast, chrome mordant. Dyed acid, very moderate.
Ironing: Slightly redder and duller.
Light: Moderate; inferior to Gallocyanine.
Perspiration: Fast.
Potting: Bleeds off.
Rubbing: Very good; better than the alizarines.
Steaming: Stands decating at low pressure.
Sulphur: Turns greener.
Washing: Good on a chrome mordant.
Water: Fast.
Peroxide Bleach: Fugitive.

SENSITIVE TO METALS, LIME: Iron turns the shade greener. Copper has no effect on the shade.

OTHER PROPERTIES: Gives Indigo test with nitric acid.

ON OTHER MATERIALS: Silk: Dyed with a chrome alum mordant.

PRINTING: Excellent for calico printing with acetate of chrome.

COMPETING PRODUCTS: Made in the United States by American Aniline Products, Inc., under name of Alizarine Sky Blue; National Aniline & Chemical Company, under name of Chrome Blue GD; Consolidated Color & Chemical Company (Selling Agents, General Dyestuff Corporation), under name of Wool Blue DC.

GALLOCYANINE
(Schultz No. 626)

COMPOSITION: Oxazine.

SPECIALLY SUITABLE FOR: Cotton and wool.

USUAL METHOD OF DYEING: On wool, with chrome and tartar; on cotton, with chrome in an alkaline bath.

SHADE: Bright reddish navy blue; very bloomy overhand

SHADE BY GASLIGHT: Darker.

SOLUBILITY: Insoluble; use ammonia.

LEVEL: Dyes level.

FASTNESS TO:
Acid: Fast on cotton and wool.
Alkali: Not fast on cotton.
Fulling: Fast.
Light: Fairly fast; inferior to Alizarine Blue; fades darker.
Rubbing: Good up to 1 per cent.
Scouring: Scours off about like the alizarines.

OTHER PROPERTIES: Used in combination with S-181 and S-862 for the production of men's wear navies. Full bloomy shade of good covering qualities.

DYED BY OTHER METHODS: Cotton: Fast to light, soaping and acids, but fugitive against alkali. Silk: Dyed by regular method for mordant colors.

COMPETING PRODUCTS: Made in the United States by Calco Chemical Company, under name of Alizarine Blue RBN; American Aniline Products, Inc., under name of Alizarine Navy Blue AT and Gallocyanine Bisulphite R and G; Zinsser & Co., under name of Alizarine Navy Blue Z2R; Consolidated Color & Chemical Company (Selling Agents, General Dyestuff Corporation), under name of Gallocyanine I.

NEW BLUE
(Schultz No. 649)

COMPOSITION: Oxazine.

SPECIALLY SUITABLE FOR: Cotton for tannin resist styles.

USUAL METHOD OF DYEING: With tannin.

SHADE: Bright greenish blue.

FASTNESS TO:
Acid: Fast to acetic; decomposed by mineral acids.
Alkali: Fairly fast.
Chlorine: Destroyed.
Light: Fugitive.
Steaming: Stands steaming.
Washing: Fairly fast.

ON OTHER MATERIALS: Silk: Even on tin-weighted silk. Fairly fast to water and washing. Topped with tannin, much faster. Paper: Unsuitable. Leather: Unsuitable.

PRINTING: Direct, not suitable; sensitive to steaming.

DISCHARGING: Oxidation discharge a pure white.

COMPETING PRODUCTS: Made in the United States by E. C. Klipstein & Sons, under name of Meldola Blue; American Aniline Products, Inc., under name of Naphthol Blue 3R; National Aniline & Chemical Company, under name of New Blue DA.

GALLO VIOLET D
(Schultz No. 631)

COMPOSITION: Oxazine.

SPECIALLY SUITABLE FOR: Cotton printing and wool dyeing.

(Continued on page 578)

Technical Notes from Foreign Sources

Mordants from Phenols

In British Patent No. 215,012 there is described a process for the manufacture of mordants which are made from sulphurized compounds of phenols. The sulphurized phenols are completely soluble in aqueous solutions of sodium carbonate and are suitable for use as mordants for basic dyestuffs. These sulphurized phenols are obtained by heating a mixture of phenol, sulphur and a small proportion of iodine, the last named substance acting as a catalyst.

For example, 188 grams of phenol, 107 grams of sulphur and a small quantity of iodine are heated to a temperature of 190 deg. Cent., and then at a temperature of 210 degrees for a period of 4 to 5 hours. Thereafter the heating is continued at a temperature of 250 deg. Cent. for another 4 to 5 hours, or until evolution of hydrogen sulphide ceases. The viscous product is then cooled and powdered.

Color Resist Printing on Sulphur Dyestuffs

The mercerized fabric is given a preliminary treatment in a chamber which is filled with hot air with the aid of a solution containing 25 grams of resorcinol to the liter. It is also possible to employ for this purpose a mixture of resorcinol and potassium ferrocyanide. The basic coloring matters which are dissolved in the phenol are printed on the fabric after the addition of a chloride of zinc resist paste and formaldehyde. The fabric is then passed for three minutes through a Mather-Platt apparatus and thereafter it is dyed in a warm dye liquor, which contains the coloring matter dissolved in sodium sulphide and sodium carbonate. The fabric is then washed, acidified and soaped as usual.

The basic dyestuffs which are fixed to the fiber in this manner by means of formaldehyde-resorcinol possess a high degree of fastness, which cannot be compared with the fastness that is attained in the case of coloring matters which are fixed to the textile fiber with the aid of tannin or zinc tungstate.

In order to obtain colored resist effects with basic coloring matters when sulphur dyestuffs are employed in obtaining the ground on the fabric, tannin fixation of the coloring matter was used with the idea of seeing just how effective this classic method of mordanting dyestuffs was. For this purpose the cloth was first steeped in a tannin bath, then it was printed with a mixture which contained chloride of zinc and the basic coloring matter. Thereafter the fabric was steamed in a rapid steaming device and then dyed for a few minutes in a sulphur dye liquor. Then the fabric was washed, acidified and soaped.

This process yielded very beautiful color resist effects, but no white effects were obtained when chloride of zinc and kaolin were employed, for it was found that the tannin mordant had the effect of dirtying the white portions of the fabric. Another experiment was made with the idea of testing the value of the well-known mordanting process in which a combination of potassium ferrocyanide and zinc salts was employed for mordanting the basic coloring matter. This method seemed to be more suitable for this purpose for the reason that chloride of zinc in such resist combinations, of which it forms the principal ingredient, is generally very satisfactory. The cloth was accordingly impregnated with the potassium ferrocyanide and then printed with a paste which contained the chloride of zinc and the basic coloring matter. Thereafter the fabric was treated in the same manner as has been described above.

Very fine resist effects were obtained in this manner, and in this case the white portions of the fabric are not impaired in any manner. On the other hand, the fastness of such printed and dyed fabrics is not everything that might be desired. In fact, the degree of fastness is only comparatively slight. It therefore follows that the use of formaldehyde and resorcinol is an entirely new method of fixing the resist designs on the fabric and gives results which are entirely satisfactory. It is evident that the two substances form a condensation product when the cloth impregnated with them is steamed, and it is this condensation product which fastens the coloring matter on the fiber. (Der Textilchemiker und Colorist, number 13, 1925, page 99.)

Color Lakes

In an article which appeared in Revue Generale des Matieres Colorantes, 1925, pages 168-9, there is discussed the color lakes that are formed with resorcinol. It is brought out therein that although the resorcinol color lakes are not very fast, they are nevertheless employed for the production of substitutes for vermilion and geranium lakes. The precipitation always takes place with the aid of acetate or nitrate of lead.

In the article various formulae are given for making resorcinol color lakes. For example, the composition that is employed with an eosine dyestuff to obtain a color lake which is often used for imitating cinnabar is as follows: 25 kilograms of sulphate of barium, 50 kilograms of minimum, 1,000 kilograms of water, 12 kilograms of eosine, 17 kilograms of acetate of lead and 1,000 kilograms of water. The lake is formed on minimum or on a mixture of minimum and sulphate of barium.

Vermilion reds are prepared with eosine lead lakes on a sulphate of barium ground or by mixing these lakes with lakes prepared from ponceaux dyes. The acid coloring matters are precipitated in the state of baryta lakes, and more rarely in the state of lead or lime lakes.

In order to obtain lakes of brilliant color and possessed of good covering power with the aid of the acid

coloring matters, it is necessary to bear in mind the important roie that is played by the concentration of the coloring matter as well as of the various solutions of chemicals employed, of the order in which the operations are carried out, of the duration of the addition of the precipitant, and above all, of the temperature at which the reaction takes place.

The coloring matters that are difficultly soluble should be diluted as far as possible and dissolved at an elevated temperature. The precipitation must be carried out at such a temperature that the coloring matter remains in solution after the operation is completed, and gradually settles out as the precipitant is added.

It is often interesting to precipitate certain basic coloring matters on the acid lakes. In this process tannin and acetate of soda are employed and the basic color is precipitated on the acid lake just as if a simple dyeing with a basic dye is being carried out. It is also possible to operate in the reverse manner, and also in certain cases to make one coloring matter act on the other which often results in the formation of insoluble combinations which can be converted into lakes with the aid of chloride or barium or tannin.

The acid lakes have the advantage over basic lakes of being more fast to light. It is very interesting to note their complete insolubility in almost all the common organic solvents and particularly in the oils. This property of the acid lakes may be assigned to the presence of the sulphonic acid radicle in the molecule.

When the basic coloring matter is employed in small quantities, it is customary to add first the solution of acid coloring matter to the ground, then the solution of basic coloring matter, and finally to complete the precipitation with the aid of a solution of chloride of barium. On the other hand, if the basic coloring matter is employed in sufficiently large proportions, it is customary first to precipitate the acid coloring matter with the aid of chloride of barium, then to add the solution of basic dyestuff which is thereafter fixed by means of tannin and ttar emetic. In this way there are obtained very brilliant shades, but the fastness of the colors to light is far from being perfect.

The direct coloring matters generally act in the same manner as the acid dyestuffs as far as the formation of lakes is concerned, and are precipitated in the same way. The direct colors are, however, noted for their excellent fastness and are being used more and more extensively for the manufacture of color lakes.

Manufacture of Imitation Velour

In French Patent No. 563,246 there is described a process for the manufacture of a textile product which looks like velour. This is accomplished by coating a lightweight fabric with a solution of rubber and then allowing the rubber solvent to evaporate; thereafter the coated fabric is again coated with a dilute solution of rubber. The surface of the fabric is then coated with finely pulverized silk, wool or cotton. The fabric is then passed between heated rolls and thereafter dried. It is also possible to vulcanize the rubber.

New Investigations in the Dyeing Process

This was the subject of an address which was recently delivered by Dr. R. Haller before the Tenth Congress of the International Society of Color Chemists which was held in Vienna this year.

The micellar structure of cellulose is to be considered, according to Naegeli, in such a manner the definitely arranged mi-cells are held together by a binding agent which has the power of swelling up when it comes in contact with water. For example, cotton is approximately 16 per cent hydratable, that is, possesses that much capacity of swelling up with water. This may be easily determined by measuring the microscopic photographs of the fiber. The coloring matter penetrates into the fiber through the hydrolyzable binding agent.

It has also been shown that it is just this part of the fiber which is qualified to absorb greater quantities of coloring matters. When such absorption of coloring matter takes place it is natural to expect an increase in the volume, and this may be determined to be 1.2 per cent in the case of basic coloring matters which are dyed on the fiber with the aid of a tannin-tarter emetic mordant.

The dyeing takes place in two ways. If the particles of the coloring matter are distributed over the surface of the fiber, then this is known as "apposition" dyeing, but when the dyestuffs enters into the interior of the fiber, the dyeing is known as "intussuszeption" dyeing.

In accordance with the character of the fixation of the coloring matter on the textile fiber, it is possible to differentiate between the four following typical cases of dyeing:

1. Pure mechanical fixation which is found in the case of the pigment colors.

2. Lake or pigment formation on the fiber or in part within the fiber, when mordants, such as tannin and the like are employed. This is known as dyeing by color developing.

3. Adsorption combinations of the coloring matter with the fiber in the case of vat and sulphur dyestuffs.

4. Precipitation of the particles of the coloring matter on the fiber as in the case of the benzidine (salt) coloring matters.

The coloring matters are in the colloidal condition in their solutions. The sub-microns are easily detected with the aid of the ultra-microscope. The degree of dispersion of the coloring matter solutions plays an important role in the dyeing process. It must not be too little, as otherwise flocculation takes place, and then again it must not be too great, as then fugitive dyeing results. The character of a dyeing process is therefore intimately connected with the optimum degree of dispersion of the coloring matter.

Molecularly dissolved coloring matters do not dye. Highly dispersed coloring matters, on the other hand, penetrate through the fiber, but they do not color it. The addition of electrolytes results in the flocculation of highly dispersed color solutions. Considerable use is made of this property in practice.

A very interesting matter is dyeing under pressure. It can be shown that when the dyeing process is carried out

under pressure the particles of the dyestuff separate out as crystals on the cotton fiber. Experiments which were carried out with indigo, chrome yellow, direct and mordant dyes gave the same results. The same behavior is noted when the dyed fabrics are cooked under pressure. No sublimation takes place. It is much more likely the case that in the pressure treatment of the fabric the hydrolyzable substance of the cellulose allows the particles of the coloring matter to penetrate between the microcells into the interior of the fiber, where the coloring matter is then crystallized. This very noteworthy fact clears up very well the behavior of the coloring matter when the fabric is dried and ironed, or when it is soaped and steamed in order to increase the fastness of the dyestuff. Similar conditions may be assumed to pertain to the steaming of printed goods, as in this case as well, colloids are present, for example, the thickening agent and the textile fiber. (Der Textilchemiker und Colorist, 1925, 85-86.

FOREIGN DYES IMPORTED DURING JULY

(*Continued from page* 571)

Name of Dye and Manufacturer	Quantity (pounds)
Sulphon Orange G—(By)	309
Sulphon Yellow R—(By)	794
Supramine Black BR—(By)	531
Supramine Black R—(By)	700
Supramine Bordeaux B—(By)	200
Supramine Brown GR—(By)	663
Supramine Red B, 3B, 2G—(By)	1,200
Supramine Yellow GR—(By)	820
Wool Blue 5B—(A)	200
Wool Blue RR Extra—(By)	660
Wool Violet RC—(G)	110
Xylene Milling Blue BL Conc.—(S)	500

Vat Dyes

Algol Blue 3RP Powder—(By)	1,664
Algol Yellow WF Powder (s. s.)—(By)	760
Alizarine Indigo 5R Paste—(By)	798
Alizarine Indigo 7R Paste—(By)	399
Alizarine Indigo Black B Paste—(By)	10
Alizarine Indigo Brown R Paste—(By)	6,979
Alizarine Indigo Gray B Paste—(By)	400
Alizarine Indigo Green G Paste—(By)	105
Alizarine Indigo Red B Paste—(By)	300
Alizarine Indigo Violet B Paste—(By)	405
Anthra Brilliant Green 5G—(B)	1,141
Anthra Gray BL Dbl. Paste (s. s.)—(B)	88
Anthra Printing Black BG Paste—(B)	44
Anthra Violet BB Paste—(B)	
Anthra Violet BB Powder (s. s.)—(B)	59
Anthra Wool Brown CM Vat Solid—(B)	100
Anthra Wool Red BBCR Vat Solid—(B)	100
Anthra Wool Yellow CG Vat Solid—(B)	50
Ciba Pink BG Powder (s. s.)—(I)	2,200
Cibanone Blue 2G Powder—(I)	551
Cibanone Brown R—(I)	110
Eridan Brilliant Scarlet B Paste—(K)	500
Grelanone Blue CG Paste—(Gr-E)	112
Grelanone Brown B Paste—(Gr-E)	112
Grelanone Yellow RG Paste—(Gr-E)	112
Helindone Printing Black RD Paste—(M)	4,000
Hydron Olive GN Paste—(C)	500
Hydron Pink FB Paste—(C)	
Anthra Pink B Extra Paste—(B)	
Anthra Pink B Extra Powder—(B)	507
Hydron Pink FF Powder (s. s.)—(C)	
Anthra Pink R Extra Paste—(C)	
Anthra Pink R Extra Paste—(B)	
Anthra Pink R Extra Paste (s. s.)—(B)	
Helindone Pink R Extra Paste—(M)	3,569
Hydron Scarlet BB Paste—(C)	
Hydron Scarlet BB Powder (s. s.)—(C)	900
Hydron Sky Blue FK Paste—(C)	600
Hydron Violet R Powder (s. s.)—(C)	275
Hydron Yellow NF Paste—(C)	5,200
Vat Blue GCDL Dbl. Pst. (s. s.)—(B)	87
Vat Blue RC Paste—(B)	44
Vat Blue Green B Dbl. Pst. (s. s.)—(B)	1,044
Vat Brilliant Blue R Paste—(B)	977
Vat Brilliant Violet RRBA Dbl. Pst. (s. s.)—(B)	2,456
Vat Brown FFR Paste—(B)	
Vat Brown FFR Powder (s. s.)—(B)	1,162
Helindone Brown IGG Paste—(M)	
Vat Brown 2G Paste—(B)	
Vat Brown GG Paste—(By)	
Vat Brown GG Powder (s. s.)—(By)	4,648
Helindone Brown IRT Paste—(M)	
Vat Brown RT Paste—(By)	
Vat Brown RT Powder (s. s.)—(By)	2,594
Vat Golden Orange 3G Paste—(By)	
Vat Golden Orange 3G Powder (s. s.)—(By)	1,610
Vat Orange 3R Paste—(By)	2
Vat Gray RRH Powder (s. s.)—(By)	3
Vat Green G Dbl. Paste (s. s.)—(By)	
Vat Green G Dbl. Paste (s. s.)—(B)	5,266
Vat Green GG Dbl. Paste (s. s.)—(By)	
Vat Green GG Dbl. Paste (s. s.)—(B)	96
Vat Khaki GG Paste—(B)	
Vat Khaki GG Powder (s. s.)—(B)	1,800
Vat Printing Black BG Paste—(By)	2
Vat Yellow GP Powder—(B)	300
Vat Yellow Brown 3G Paste—(By)	
Vat Yellow Brown 3G Powder (s. s.)—(By)	1,162
Thioindone Olive B Paste—(K)	100

Mordant and Chrome Dyes

Acid Alizarine Gray—(M)	88
Acid Anthracene Brown KG—(By)	100
Acid Anthracene Brown PG—(By)	1,320
Acid Anthracene Brown WSG—(By)	485
Acid Anthracene Red 5BL—(By)	400
Acid Chrome Blue 3G—(By)	200
Acid Chrome Yellow RL Extra—(By)	798

Name of Dye and Manufacturer	Quantity (pounds)
Alizarine Fast Black SP Paste—(By)	499
Alizarine Fast Blue BHG—(By)	300
Alizarine Fast Gray 2BL Powder—(By)	2,778
Anthracene Brown RP Paste—(By)	5
Chromazone Red New Conc.—(G)	220
Chrome Printing Red Y—(DH)	441
Chrome Red Brown 3RD Paste—(By)	5
Chromogene Azurine B—(M)	100
Chromoxane Azurol BD—(By)	50
Chromoxane Brilliant Violet SB—(By)	4,150
Chromoxane Green 2G—(By)	400
Chromoxane Pure Blue B, BLD—(By)	6,575
Chromoxane Violet 5B—(By)	1,350
Eriochromal Brown G Powder—(G)	110
Eriochrome Geranol R Conc.—(G)	220
Foulard Discharge Blue B—(By)	50
MetaMetachrome Blue Black 2BX—(A)	2,000
Metachrome Violet 2R—(A)	100
Modern Gray RCN Powder—(DH)	882
Modern Olive JN—(DH)	110
Naphthochrome Violet R—(I)	441
Oxychrome Brilliant Blue PB—(A)	700
Pilatus Chrome Brilliant Blue B—(B)	200
Radio Chrome Blue B—(C)	900

Direct Dyes

Artificial Silk Black GR—(By)	200
Benzo Fast Black L—(By)	500
Benzo Fast Blue 2GL, 4GL—(By)	2,610
Benzo Fast Brown GL, 3GL, RL—(By)	3,314
Benzo Fast Eosine BL—(By)	300
Benzo Fast Gray BL—(By)	500
Benzo Fast Heliotrope 4BL, 5RH—(By)	998
Benzo Fast Orange 2RL—(By)	1,411
Benzo Fast Red 6BL—(By)	200
Benzo Fast Yellow RL—(By)	2,294
Benzo Red 12B—(By)	555
Benzo Rhoduline Red B, 3B—By)	400
Benzo Rubine SC—(By)	100
Benzoform Blue G Extra—(By)	10
Benzoform Brown 4R—(By)	10
Brilliant Benzo Fast Yellow GL—(By)	200
Brilliant Benzo Green B—(By)	529
Brilliant Benzo Violet 2BH, 2BR—(By)	684
Brilliant Congo Violet R—(A)	500
Brilliant Fast Blue 3BX—(By)	800
Brilliant Pure Yellow 6G—(By)	600
Brilliant Sky Blue 8G Extra—(By)	3,164
Brilliant Sky Blue R—(By)	200
Brilliant Sky Blue 2RM—(By)	4,532
Brilliant Triazol Fast Violet 4BL (Gr-E)	224
Chloramine Fast Red 2RL, 7BL—(I)	110
Chloramine Light Gray R Conc.—(S)	1,001
Chlorantine Fast Brown BRL—(I)	1,543
Chlorantine Fast Green B—(I)	2,755
Chlorantine Fast Red 7BL—(I)	441
Chlorantine Fast Violet 5BL, RL—(I)	5,290
Chlorazol Fast Orange AG—(BD)	500
Diamine Azo Fast Green G—(C)	276
Diamine Brilliant Scarlet S—(M)	1,000
Diamine Catechine B—(C)	500
Diamine Fast Orange ER—(C)	1,500
Diamine Fast Rose G—(C)	10
Diaminogene GG—(C)	992
Dianil Fast Orange 2R—(M)	100
Diazo Black VG—(I)	1,102
Diazo Bordeaux 7B—(By)	1,322
Diazo Brilliant Green—(By)	6,164
Diazo Brilliant Scarlet 2BL Extra—(By)	4,934
Diazo Brilliant Scarlet 6B Ex., G Ex.—(By)	22,424
Diazo Brown G, 3G, 6G, 3RB—(By)	5,988
Diazo Fast Blue 6GW—(I)	220
Diazo Fast Green GF—(By)	100
Diazo Fast Violet BL, 3BL—(By)	1,485
Diazo Fast Yellow G—(By)	300
Diazo Indigo Blue 4GL Extra—(By)	2,439
Diazo Light Violet BL—(By)	1,200
Diazo Rubine B—(By)	855
Diazo Sky Blue 3G, 3GL—(By)	2,518
Diazo Yellow R—(By)	600
Diphenyl Catechine R Supra—(G)	1,102
Diphenyl Fast Brown GNC—(G)	6,605
Fast Cotton Gray VL—(A)	800
Fast Cotton Yellow RL—(A)	200
Minaxo Black BBNX—(B)	520
New Bordeaux RX—(B)	50
Paranil Black 2B—(A)	10
Pluto Brown GG—(By)	300
Pultoform Black BL—(By)	10
Pyrazol Fast Brown B—(S)	493
Toluylene Fast Brown 2R—(By)	200
Toluylene Fast Orange GL—(By)	300
Triazol Light Brown 3GL—(Gr-E)	112
Triazol Light Gray BL—(A)	28
Zambesi Black D—(A)	1,000

DYEING ACETATE SILK

(Continued from page 556)

Enter cold and dye at 80 deg. Cent. (176 deg. Fahr.) for one hour.

Most of the SRA dyes show excellent fastness to washing and rubbing, while the fastness to acids, light and alkalies varies with the particular product used, as it does when these same compounds are applied by any other method. The SRA dyes, with the exception of SRA Blues I and II, withstand wool cross-dyeing very well and may be used in this manner; however, acetic acid should be used in place of sulphuric acid in dyeing the wool. As most wool dyes are applied at or near the boiling temperature it is best to select those wool dyes which are applicable at lower temperature, i. e., below say 85 deg. Cent. (185 deg. Fahr.) for use on acetate silk-wool unions. Certain CR wool dyes selected especially for

application at low temperatures will be mentioned later under unions.

In dyeing acetate silk—real silk unions—the silk must be boiled off at a temperature below 85 or 90 deg. Cent. (185 to 194 deg. Fahr.) which works out well in practice. Most of the SRA dyes stain real silk, and if it is desired to leave the real silk white, the SRA dyes must be selected for this purpose.

The SRA dyes have been printed on Celanese by merely thickening the 10 per cent paste with the usual thickening agents and steaming, with only minor variations from the usual printing practice. As a class, the SRA dyes do not discharge well with hydrosulphites but some discharge better than others.

Fine yarns are frequently dyed by hand using double sticks. They are also dyed on a machine with porcelain rollers. Bobbins, pins, cheeses and beams are not usually attempted as yet. Hanks are usually entered at the dyeing temperature. The jig is very applicable in dyeing Celanese piece goods.

NOTE.—The SRA and Solamine dyestuffs, combined with the special methods of applying them, are the protected property of British Celanese Limited, and can only be used in conjunction with their products.

(Part XIII will appear in an early issue.)

DYESTUFF TABLES

(Continued from page 573)

USUAL METHOD OF DYEING: On wool, with acetic acid on a chrome bottom; on cotton, with acetate of chrome. Fixation very slight; a short steaming is sufficient.

SHADE: Greener and clearer than Gallocyanine.

SHADE BY GASLIGHT: Redder.

SOLUBILITY: Good.

LEVEL: Like Gallocyanine.

EXHAUSTS: Same as Gallocyanine.

FASTNESS TO:

Acid: Fast.
Alkali: Fast.
Chlorine: Fast.
Fulling: Like Gallocyanine.
Ironing: Fast.
Light: Equals Gallocyanine.
Rubbing: Same as Gallocyanine.
Washing: Very good.

OTHER PROPERTIES: The shade on chromed wool is very clear, though not as clear as Celestine Blue.

DYED BY OTHER METHODS: Cotton printing: Can be used for discharging Paranitraniline Red with tin. Can be discharged a good white with oxidizing agents. Pieces chrome padded and discharged are dyed well in a neutral bath and the white remains. The fastness to light and washing of the chrome lake is very good. It will also stand a slight chloring. Padded shades may also be discharged with chlorate. It is necessary to use acetic and tartaric acid with the color in pad dyeing to prevent precipitation.

PRINTING: Wool: Suitable for slubbing with acetate of chrome. Cotton: Can be used for color discharge with hydrosulphite.

COMPETING PRODUCTS: Made in the United States by American Aniline Products, Inc.

NEWPORT ANNOUNCES NEW DIRECT BROWN

Newport Direct Brown GRN is the name of a new Direct Brown recently put on the market by Newport Chemical Works, Inc. A loose-leaf insert has been issued, uniform with other inserts for the Newport Binder, describing this new color and exhibiting it on swatch bows of unbleached cotton yarn. Its notable properties, fastness properties and application are given on this leaflet.

Newport Direct Brown GRN is said to be of interest for the dyeing of cotton yarns, warps, piece goods, etc. It is described as possessing very good fastness to hot pressing and steaming and its fastness to light is also said to be good, especially in the aftertreated shade. Rayon is dyed well, while Celanese and Lustron are somewhat stained. Pure silk may be dyed from neutral or acid baths, the acid bath producing stronger and slightly redder shades. It is claimed to produce a good union on wool and cotton mixtures, while in silk and cotton materials the silk is dyed redder and somewhat brighter. It discharges white in the straight shades while the aftertreated shades give a somewhat creamy tone.

DU PONT ANNOUNCES NEW BLACK

E. I. du Pont de Nemours & Co. have placed on the market a new color designated as Pontamine Fast Black CW, a product particularly manufactured to leave Celanese white. This product is described as having good fastness for a direct color and is said to be reasonably fast to acids, alkalies, etc. It is recommended for the dyeing of cotton piece goods to leave Celanese white. It dyes best with the addition of 20 per cent Glauber salt at a temperature of 160 deg. Fahr.

OFFICE MANAGER

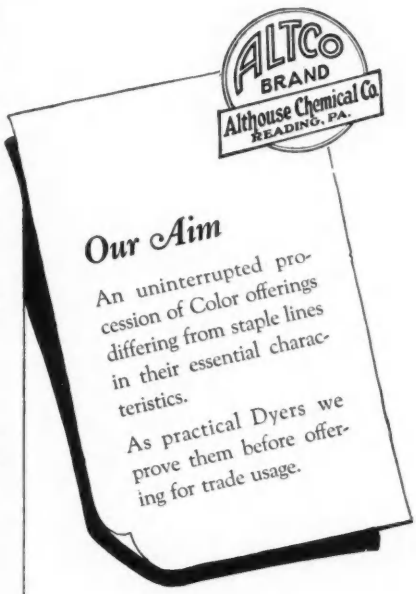
Office manager wanted for Chicago office of dyestuff and chemical manufacturers. Person desired who has practical knowledge and experience in the same industry. Reply Box 309, American Dyestuff Reporter.

TEXTILE CHEMIST

WANTED—Young Textile Chemist for research work in the chemical laboratory of a large silk dyeing concern. Reply to Box 310, American Dyestuff Reporter, giving full information regarding education, experience, age and salary desired.

CHEMIST

WANTED—Chemist in manufacturing concern where salary is not so much an object as a future. Must have experience with textile sizings. Give full particulars as to experience, salary to start, references, etc. Reply to Box 311, American Dyestuff Reporter.


ALTCo
BRAND
Althouse Chemical Co.
READING, PA.
Our Aim
An uninterrupted procession of Color offerings differing from staple lines in their essential characteristics.
As practical Dyers we prove them before offering for trade usage.

Althouse
Benzanol Art Black

A reddish tone Black suitable as a saddening agent, but affording a bloom to contrasting shades and a particularly even effect in dark Grays, Tans and all Brown shades.

¶ Here is found a color admirably suited to Artificial Silk and Mercerized fibre combinations.

A sample sent on request

Althouse Chemical Company
READING, PA.

DYES
for
"Celanese" Brand Yarns, Fabrics, Etc.

"CR" (Celanese Resist) Cotton Colors
Dye Cotton and Artificial Silk
LEAVE CELANESE WHITE

"SRA" Colors
DYE CELANESE
Leave Cotton and Artificial Silk White

By use of "CR" and "SRA" dyestuffs any TWO COLORS can be obtained in ONE BATH on "Celanese" and Cotton or "Celanese" and Artificial Silk.

"CR" and "SRA" dyestuffs are made specifically for use with "Celanese" and are prepared and tested under expert supervision.

To meet the public demand for colors FAST to LIGHT and WASHINNG we offer "SRA" for DYEING CELANESE. Economical to use, they assure moderate cost in dyeing.

SAMPLES SENT ON APPLICATION
Authorized Distributors

AMERICAN-BRITISH CHEMICAL SUPPLIES, Inc.
Room 1505, 15 East 26th Street, New York City
Telephone, Madison Square 3312

"Celanese" is the registered trade-mark of the American Cellulose & Chemical Manufacturing Co., Ltd., 15 East 26th Street, New York, N. Y., for its yarns and fabrics, etc.

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CAUSE *and* EFFECT

The quality of EXL dyes is topnotch because the materials that enter into their composition meet definite specifications of quality.

Definite quality is therefore a foregone conclusion.

The high standards of EXL dyes will be steadfastly maintained. This is a promise and a guarantee.

UNITED ANILINE COMPANY

Dyestuffs and Chemicals

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"EXL DYES EXL"

HYDROSULFITE

AN improved process in the manufacture of Hydrosulfite enables us to offer a uniform product, completely soluble, that will not precipitate inactive metallic matter in the stripping bath.

May we submit sample and price?

ARKANSAS CO., Inc.

233 BROADWAY
NEW YORK CITY

DU PONT DYESTUFFS

Pontamine Fast Orange EG
Pontamine Fast Brown RK

Two unusually resistant direct colors

THESE two colors are very fast to light, with excellent fastness to chlorine for direct dyes, and considerably better fastness to water, washing, acid and alkalies than the average substantive color. They are very soluble and level dyeing, and may be used on cotton in all stages of manufacture.

These latest Du Pont Dyestuffs possess other desirable properties and represent two types which should be carefully investigated by all dyers.

E. I. DU PONT DE NEMOURS & CO., INC.
Dyestuffs Department
WILMINGTON DELAWARE

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For
Worsted
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We will be glad to send
to dyers of fancy dress goods
our bulletin
showing how to produce
the

Fall 1925 Shades

on
Worsted Material
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NEWPORT
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